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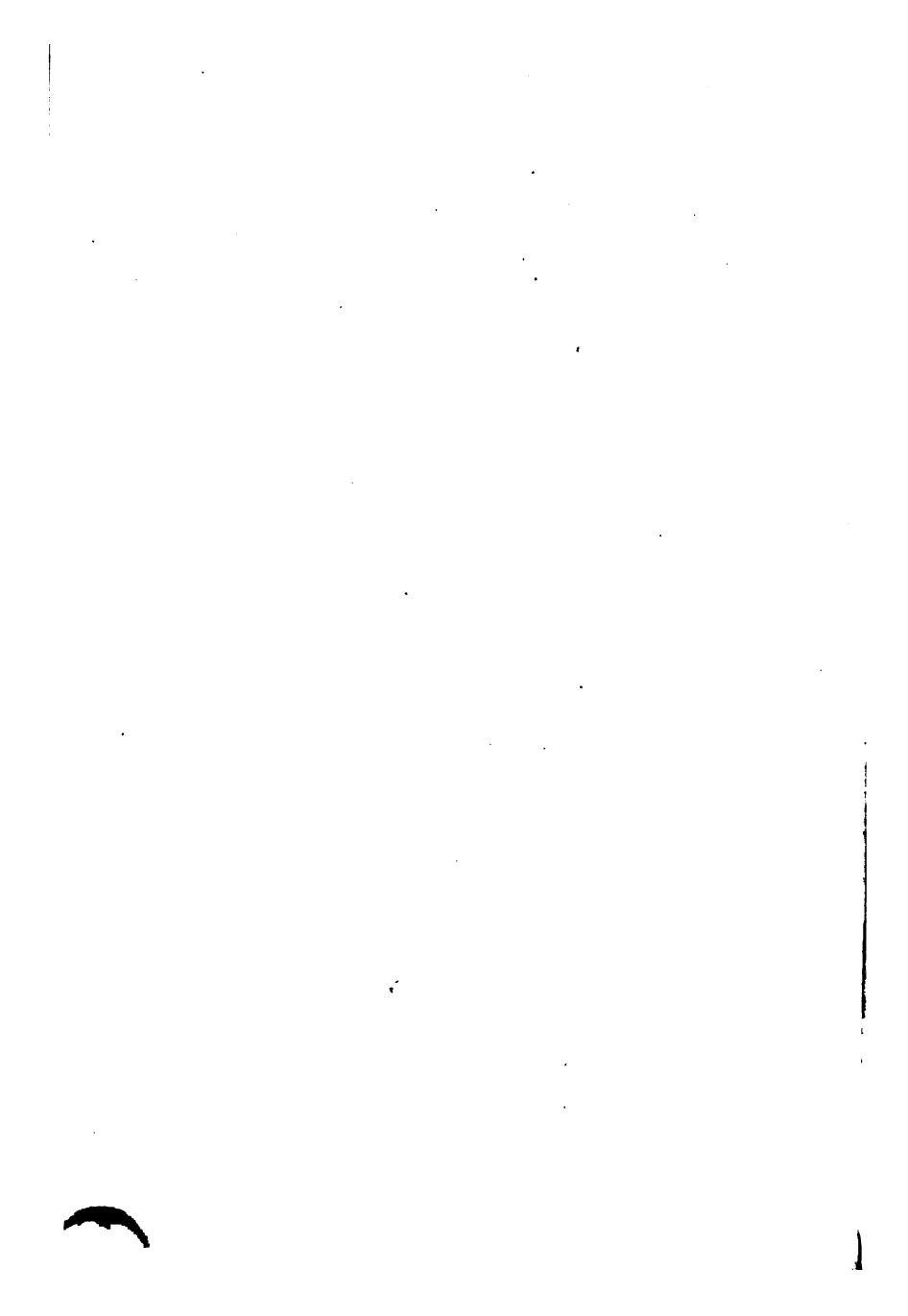
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A GEOGRAPHY
OF
AUSTRALASIA
AND THE
EAST INDIES

BY
LIONEL W. LYDE

M.A., F.R.S.G.S.

PROFESSOR OF ECONOMIC GEOGRAPHY IN UNIVERSITY COLLEGE, LONDON
EXAMINER IN GEOGRAPHY TO THE COLLEGE OF PRECEPTORS

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PREFACE.

IN this Series I have tried to embody the experience of a teacher and of an examiner. For fifteen years I have been teaching Geography constantly to classes of all sizes and all ages; and during the same period I have examined nearly 50,000 candidates in the subject.

This experience has led me to several conclusions, which will, I believe, be confirmed by most practical teachers who are interested in Geography as a subject of real educational value:—

1. That the maps which are so lavishly supplied in modern text-books, cannot generally be used directly with the text, as it is impracticable to have the book open in more than one place at a time; but that their presence in the book has led to neglect of the Atlas.
2. That an excessive variety of type and other mechanical devices for classification are apt to confuse the average pupil.
3. That most text-books contain much which would be better learned from the Atlas, or which is only an unnecessary tax on the memory.

Consequently, this Series contains no maps and little variety of type; and I have intentionally avoided mentioning, *e.g.* exact heights, distances or sizes, small

industries, and unimportant places. Wherever any definite comparisons are made, they are intended only for reference, and not to be learnt; but, of course, in teaching I do use exact standards—taken from our own locality, and therefore not equally useful elsewhere.

I hope, too, that the book has more than these negative merits. I have had the privilege of lecturing on the Teaching of Geography to a large number of practical teachers, including members of the Teachers' Guild, of the National Schoolmasters' Holiday Course, the Education Class in Owens' College, Manchester, and the Teachers' Section of the Oxford Summer Meeting. This book is written exactly on the lines of these lectures, and embodies the criticisms and suggestions of these professional audiences.

L. W. L.

CONTENTS.

	PAGE
AUSTRALASIA - - - - -	1-51
Introductory - - - - -	1
AUSTRALIA - - - - -	2-38
General Surroundings - - - - -	2
General Surface and Climate - - - - -	6
General Vegetation and Minerals - - - - -	10
New South Wales - - - - -	15
Queensland - - - - -	20
Victoria - - - - -	25
South Australia - - - - -	30
West Australia - - - - -	35
TASMANIA - - - - -	39
NEW ZEALAND - - - - -	44-51
General Geography - - - - -	44
Climate and Products - - - - -	48
OCEANIA - - - - -	52
EAST INDIES - - - - -	55-66
General Geography - - - - -	53
Climate and Vegetation - - - - -	57
Philippine Islands - - - - -	60
Dutch Islands, etc. - - - - -	63
APPENDIX ON THE ANTIQUITY OF THE AUSTRALIAN CONTINENT, - - - - -	68
PROBLEM PAPER, - - - - -	69
INDEX OF CHIEF PLACES AND SUBJECTS, - - - - -	70

AUSTRALASIA.

Introductory.

1. THE total area of the British possessions in Australasia is just over 3,000,000 square miles.

- (1) Of this large area, nearly one-third represents West Australia, and South Australia is nearly as large as West Australia ; Queensland and New South Wales together occupy another million square miles, Queensland being twice as large as its neighbour ; Victoria is about the same size as Great Britain ; and New Zealand is rather larger.
- (2) Although the Dutch had discovered most of Australasia in the seventeenth century, Captain Cook explored and opened up the most fertile parts, *e.g.* the east coast of Australia. The Dutch kept their discoveries secret, partly from commercial jealousy of Spain, and partly because the island did not seem to them to be of much value ; it is a land that could only have been developed by actual colonisation by a free race, and their whole colonial system depended on slave labour.
- (3) The arrival of the first 'convict' fleet at Botany Bay in 1788 is the beginning of its real history, and the settlement of the country seemed to the English to replace the lost United States ; the first goldfield was discovered in 1835.

AUSTRALIA.

General Surroundings.

1. AUSTRALIA is an island, but it is so large that it may be regarded as a continent.

- (1) It is 25 times the size of the United Kingdom, and ranks next to Canada among the individual areas of the Empire.
- (2) The surrounding oceans, the regular winds, and the surface, all emphasise the continental, rather than the insular, element in its climate and productions.
- (3) Its oceanic isolation emphasises the insular element, rather than the continental, in its politics and commerce.

2. The coast line is singularly unbroken, which affects both climate and commerce adversely.

- (1) The indentations which do exist, *e.g.* the Gulf of Carpentaria and the corresponding Great Bight, have little effect on the 'solidarity' of the whole continent; but the Australian coast, though less indented than the coast of any continent north of the Equator, is more indented than that of Africa or South America.

N.B.—The total length of about 10,000 miles gives an average of 1 mile of coast to 300 square miles of surface, compared with 1 to 190 in Europe and 1 to 750 in Africa.

- (2) Warm westward currents wash the N., E., and S. coasts, and would carry abundant moisture inland if the coasts were broken and the winds blew regularly inland; and they do encourage innumerable forms of marine life, *e.g.* turtles, oysters, sponges, coral, etc., in the shallow shore waters.
- (3) The S. and W. coasts are the worst; along the W. coast there is a cold northward current, off which evaporation is slight and slow, and the interior is a desert.

3. The South coast has two natural divisions, of which the eastern should be studied along with the East Coast.

- (1) The western half is an almost unbroken wall of rock for nearly 1000 miles. Albany, on King George Sound, is the only real harbour, though Esperance Bay may become an important roadstead in connection with the Dundas goldfields.
- (2) The eastern half is much more broken—Spencer Gulf, the Gulf of St. Vincent, and Port Phillip being really valuable inlets; but abrupt cliffs, a heavy swell, and sunken islands make navigation difficult and dangerous.
- (3) Port Augusta and Port Pirie are fairly good harbours. The former is the outlet for a large pastoral and wheat area, and the terminus of the—as yet unfinished—*Great Northern Railway*; the latter is the chief wheat port of Australia, and has a large through-trade to the N.S.W. silver mines at Broken Hill and Silverton.
- (4) Port Adelaide has a good natural harbour under the lee of Mount Lofty, and is more important than it would be if the mouth of the Murray river could be used as a harbour.
- (5) Port Phillip is, perhaps, the most important harbour in the southern hemisphere. It has an area of 800 square miles, and is very safe; vessels can go up the Yarra into the very heart of Melbourne, and the city monopolises the whole export trade of Victoria in gold, wool, and butter, mainly from Port Melbourne and Williamstown.

4. The West Coast, from Cape Leeuwin to Cape Leveque, is low, monotonous, and blocked by coral reefs and islands.

- (1) The shallow water, the cross currents, and the summer hurricanes make navigation very precarious, especially in the north; and the north is also very unhealthy, and has very high tides (46 feet regularly in King Sound).

- (2) Shark Bay, the only important northern inlet, has a valuable pearl fishery (mainly 'mother-of-pearl'); and there are several other important pearling stations, e.g. Roebourne and Broome.

N.B.—The Alien Act is driving away the 'coloured' divers to New Guinea, and the summer (February) hurricanes cause great loss of life and property.

- (3) In the south, though the Swan river is very shallow, Freemantle has been made into a fairly good harbour to accommodate the trade up to Perth; but the shallow water, the direction of the prevailing wind, and the strong north-eastward current round Cape Leeuwin, make the approach from the south dangerous and difficult.

5. The North coast, from Cape Leveque to Cape York, has a vile climate, but several fine bays.

- (1) The best is Port Darwin, the harbour of Palmerston, which has excellent accommodation for shipping, and is accessible by the largest vessels in any state of tide or weather. It is the junction of the Overland Telegraph with the Eastern Cable, and the destined terminus of the Trans-continental railway.
- (2) Thursday Island has a very fine harbour in Port Kennedy, the centre of valuable pearl and trepang fisheries, and with a convenient quarantine station—an important point in such a climate—on the neighbouring Friday Island.

✓ 6. The East coast has special advantages in the possession of some fine harbours and good coal, and the protection of the inshore water for 1200 miles by the Great Barrier Reef.

- (1) Brisbane commands the coal and wool trades of South Queensland; Rockhampton commands the gold and cattle trades of Central Queensland; Townsville commands the gold trade of Charters Towers and Ravens-

wood ; Cairns commands the tin trade of Herberton, and exports millions of bananas ; Cooktown—opposite the most northerly channel across the Reef—also has a tin trade, and exports rice, sugar, and sea-slugs.

- (2) The New South Wales ports are even more important, and some of them are wonderful natural harbours, *e.g.* Botany Bay, Broken Bay, and Port Stephens ; but they have been neglected for the artificial coal-port of Newcastle and the unique harbour of Port Jackson.
- (3) Port Jackson is a large, deep, and perfectly safe harbour, with a natural wharf of freestone on each side of the promontory on which Sydney stands ; it has a splendid climate, immense agricultural and pastoral wealth behind it, and excellent coal on each side, especially at Newcastle.

N.B.—Sydney is the *fourth*, and Melbourne is the *sixth*, port in the British Empire !

7. The Great Barrier Reef is a series of coral reefs which form a wonderful natural breakwater to the Pacific Ocean.

- (1) It stretches for more than 1200 miles from north to south, at a distance from the coast varying from 10 miles on Torres Straits to more than 100 off Rockhampton.
- (2) As the water inside the reef is almost always quite calm, and as the reef itself is always washed by strong 'breakers,' navigation is generally very safe except at night. Sailing vessels, however, generally hold a course outside the reef altogether, or 'lie to' during the night.
- (3) There are several channels of deep water across the reef. The Bligh Entrance is a sort of junction for the outer and inner routes *via* Torres Strait ; and the Flinders, the widest and safest of all, has greatly contributed to the importance of Townsville.

General Surface and Climate.

1. Australia is a huge saucer-shaped plateau, with a rim of low coastland on every side except the south.

- (1) The edge of the plateau looks from below like a range of hills—rising abruptly from the coastline, only to break off abruptly on to the plateau; and this has a very bad effect on the rainfall inland. (Cf. Africa.)
- (2) As the plateau sinks saucer-like inland, its shape favours the accumulation of water underground in the limestone of which the country is largely composed; but the dry soil and the great heat give surface water very little chance of sinking at all.
- (3) The strip of low coastland which is missing in the south, reappears in a line of sunken islands. Indeed, the original continent of which Australia is now the largest fragment, seems to have included, not only Tasmania and the other islands in the south, but also all the 'Malay' islands east of the deep Lombok Strait.

N.B.—The deep water off the east and west coasts, and the distinct flora and fauna of *e.g.* Lord Howe Island, show that the original length of the continent was not much greater than it is now.

2. These low coastlands are the best watered parts of the whole continent, especially in Queensland.

- (1) Even in the west, where there is a cold current, and where no regular winds blow inland, enough moisture is carried to the Darling Range to give excellent pasture between the hills and the sea.
- (2) Along the north coast, there is enough moisture to produce—in the tropical heat—even sugar and rice; but the climate is very unhealthy, and the prevalence at certain seasons of the year of damp, hot, still air favours the development of hurricanes.
- (3) As the edge of the plateau is very near the sea, the coastal rivers are short and subject to sudden floods;

and along the east coast, where the S.E. 'Trades' blow directly on to the Great Dividing Range, much havoc is done by the floods to valuable agricultural land, and navigation is made impossible or very precarious.

- (4) The exceptionally heavy rainfall in Queensland is due to the fact that the S.E. 'Trades' are condensed very completely by the 5000 feet of the Bellenden Ker Mountains.

3. The Great Dividing Range forms the highest part of the plateau edge, and in Mount Kosciusko and Mount Townsend rises to above 7000 feet, *i.e.* twice the height of Snowdon.

- (1) The name 'Great Dividing Range' may be fairly applied to all the successive 'ranges' which divide the coast from the interior, the most important 'range' being the Australian Alps.
- (2) Even these Alps are practically below the snow line in such a latitude; and consequently the rivers which flow from them, even the Murray and the Murrumbidgee, though very useful for irrigation, are almost useless for navigation.

N.B.—The snow line is about 6600 feet.

- (3) As the range entirely cuts off sea winds from the interior, there are vast areas of desert; and, as the great dryness is naturally accompanied by great and sudden extremes of climate, the deserts are deeply covered with the sand of disintegrated rocks.

4. The distribution of these deserts reflects the special characteristics of the surface.

- (1) As the length of the continent from east to west (nearly 2400 miles) is more than twice its average width from north to south (about 1000), some part of its surface is absorbing the sun's rays vertically in summer for three hours every day; and, owing to the earth's position in perihelion, the sun is 1,500,000 miles nearer to

Australia in the 'southern' summer than to the Sahara in the 'northern' summer.

- (2) The absence of inland peaks high enough to condense clouds, and the tendency of the plateau edge to stop sea winds entirely or to rob them of their moisture and deflect them into a higher stratum of atmosphere, increase the already excessive heat.
 - (3) The absence of shade still further accentuates the evil, and combines with the radiation from the parched interior to produce severe droughts; and the unevenly distributed rainfall is apt to lead to destructive inundations at the end of every drought.
 - (4) As each Tropic in turn is for half the year the centre of a belt of calms, no regular supplies of moisture can be carried to it during that half, even when it is not cut off from wet winds by physical obstacles.
 - (5) Consequently, the Great Sandy Desert lies along one side, and the Great (or 'Queen') Victoria Desert along the other side, of the Tropic of Capricorn. (Cf. the Sahara and the Kalahari deserts in Africa.)
5. The continental river system, again, reflects all these peculiar features.
- (1) As in Africa, the desert is not a dead level, nor a sea of sand, nor entirely barren. Most of it is a low humpy plateau; it contains mountain ranges as high as Ben Nevis, *e.g.* the Macdonnell (cf. the Tibesti Mountains); and a low sandy plain stretches across it from north to south (cf. the Libyan Desert).
 - (2) The countless subdivisions thus created have their own—temporary—river systems, all of which end in salt basins, *e.g.* the Barcoo or Cooper's Creek (cf. the Saharan Shotts), wherever their water is not at once absorbed by the thirsty soil or lost by evaporation, *e.g.* the Diamantina.
 - (3) The one exception is the Murray system, which rises amongst peaks high enough and near enough to the sea to have snow lying on them for some months.

- (4) The rivers are of very little value for navigation, partly owing to their great variation in volume and partly owing to the formation of bars by the periodical floods; but the Murray system can be used by small steamers at certain seasons of the year—as far as Albury (1000 miles), Wagga-Wagga, and Bourke.
- (5) For irrigation the rivers are invaluable, for they are full of alluvial matter, and the constant gradual slope of their basins makes irrigation by gravitation—the only cheap method—very easy; and the possibilities for a dry sunny land with good irrigation are almost endless.

N.B.—For the coastal river system, cf. § 2 (3) above.

6. The climate is marked by extraordinary contrasts both of temperature and of rainfall.

- (1) The temperature depends more on height and distance from the sea than on latitude; round the coast there is no great or sudden variation from day to night or between the seasons, whereas inland the contrasts are very sudden and very great even inside the Tropics.
- (2) The distribution of rain is very uneven and uncertain except along the east coast, where it depends on the S.E. 'Trades.' Along the north it depends on monsoons drawn landward in summer, and along the south it depends on the extension of the N.W. 'Anti-Trades,' some 10° northward of their usual limit.
- (3) In winter the 'pole of heat,' which causes the monsoons, becomes a 'pole of cold,' manifesting itself in the outflowing of intensely cold dry winds over the coastlands in all directions, and giving them a winter temperature much lower than that of places with similar latitude and altitude in Africa or South America.

General Vegetation and Minerals.

1. Most of the indigenous vegetation is, therefore, of a semi-desert nature.

- (1) True desert vegetation consists of plants which, by lengthening their roots, or restricting their height, or thickening their bark, or toughening their leaves, or presenting only the narrow edges of the leaves to the vertical sunlight, or secreting volatile oils, have adapted themselves to draw water from great depths or to resist the evaporating power of very dry air, *e.g.* cactus, acacia, eucalyptus, salt-bush, mallee-scrub, etc.
- (2) The eucalyptus and the salt-bush are particularly important. Both the 'gum' and the timber of the former are very valuable, and millions of sheep are fed on the salt-bush, especially in N.S.W. (cf. the Karroo); but the eucalyptus, like other native woods, especially jarrah ('sleepers') and karri ('paving'), is hardwood, and so not good for building purposes; and droughts are terribly destructive to the sheep—nearly 40 per cent. of the total number of sheep in New South Wales having been lost during the great drought of 1902.

2. With such a deficiency of rain and rivers inland, it is obvious that agriculture must be limited; and, as sheep pasture is less dependent on rain than any other pasture, wool is the greatest of all Australian products.

- (1) New South Wales, which practically monopolises the continental river system, is far ahead of the other colonies in the amount of wool which it produces, and is the great exporter of frozen mutton.
- (2) As both heat and rainfall increase towards the N.E., Queensland is better suited to cattle than to sheep, and is the great exporter of foreign beef, hides, and tallow.

- (3) As the heat decreases, but the rainfall increases, towards the S.E., Victoria produces the best wool, especially on the volcanic soil of the Ballarat gold area ; and this soil is also peculiarly well suited for dairy farming, especially round Benalla.
- (4) The coastlands in the extreme south-west of the continent, especially between Albany and Perth, rear very good horses.
- (5) Special areas are peculiarly suitable for camels and for ostriches.

3. Agriculture is naturally confined to the edge of the plateau and the coastlands.

- (1) The cooler and drier plateau edge produces such plants as wheat and the vine, and the latter is particularly profitable. Its long root enables it to resist drought, it requires industry rather than capital, the climate is perfect, and the stony slopes of the downs are an ideal site.
- (2) The best wine comes from the volcanic valleys of Victoria, *e.g.* Ararat, Mooroopna, and Rutherglen, and the downs of Queensland, *e.g.* Roma and Toowoomba—the lower land, where the vines get ‘baked,’ producing the heavier wines ; and the best raisins come from the drier area of the Murray basin, *e.g.* Albury, Echuca, Renmark, and Mildura. Parramatta is very famous for its oranges.
- (3) The tropical coastlands produce sugar, maize, and bananas. The sugar naturally prefers the fertile, marly soil and intermittent salt-breezes of the S.E. ‘Trades’ coast, especially between Geraldton and Herberton, and round Townsville, Mackay, and Bundaberg. The maize grows most abundantly on the low lands between Brisbane and Rockhampton, and the bananas are specially productive round Cairns.

N.B.—Cotton, coffee, cacao, rice, and other tropical crops are raised, the coffee specially along the Clarence and Richmond rivers.

4. Australia is very rich in minerals, especially coal, gold, and copper.

- (1) Coal exists in abundance along the east coast, and most of it is of very good quality. N.S.W. produces the largest amount and the best quality, the great centres being Newcastle and Illawarra, though Lithgow and Katoomba are also important; and the Illawarra collieries are close to large deposits of magnetic iron, (cf. the Lithgow coal and Cadia iron).

N.B.—Other important iron mines are at Mittagong, Rylston, and Wallerawang—the last being of fine magnetite.

Queensland has good coal near Brisbane, especially at Ipswich and Gympie, and at Clermont; and Victoria has a considerable quantity of poor coal in Gippsland.

- (2) The great gold colonies are West Australia, Queensland, and Victoria. In 'Westralia' there seems to be gold more or less universally from Hall's Creek, on the Kimberley goldfield, to Dundas, on the Lake Lefroy field—including the De Grey—(e.g. Marble Bar, Nullagine, and Pilbarra), Ashburton, and Murchison (e.g. Yalgeo, Cue, Nannine) districts; but the richest field is in the 'Coolgardie' district, e.g. at Coolgardie, Kalgurli, Menzies, Kanowna, Parker, Yilgarn, etc.

The chief gold-fields in Queensland are Charters Towers, Mount Morgan, and Gympie; and the historic mines of Victoria are round Ballarat, Castlemaine, and Bendigo (Sandhurst).

N.B.—There is a fairly large export of gold from N.S.W., especially from the Cobar district; and the N.S.W. alluvial gold areas are rich in sapphires.

- (3) Copper is the characteristic metal of South Australia; it is found as far north as Yam Creek, but the richest deposits are between Kapunda and Burra—Moonta and Wallaroo having the largest copper-smelting works in Australia. A considerable amount of copper is mined also in N.S.W., especially at Cobar (where there is also fine malachite) and Nymagee,—in Queensland, e.g. at

Cloncurry and Mareeba,—and in West Australia, *e.g.* at Northampton (also rich in lead).

- (4) Tin is the characteristic metal of Queensland, where it is found along the edge of the plateau from Maytown to Stanthorpe; but it is mined also in N.S.W., especially at Tamworth and Vegetable Creek, and in West Australia, *e.g.* at Greenbushes (near which there is also coal).
- (5) Silver is the characteristic metal of N.S.W., especially near Broken Hill and Silverton; but it is also found in Queensland, *e.g.* between Ravenswood and Bowen, and in the Lofty Range of South Australia.

N.B.—Platinum is also mined in the Fifield district of N.S.W., *e.g.* at Platina.

5. Apart from the main occupations of mining, stock-raising, and agriculture, there are few industries.

- (1) The climate in most parts of the continent is essentially unsuited to fine textile work; but the semi-marine climate and the nearness to the Ballarat sheep-pastures have led to a busy woollen industry at Geelong, and woollen industries are spreading round Sydney, especially in Parramatta.
- (2) Sydney is also the chief leather centre, mainly because of the immense pastures behind it and the widely-spread areas of acacia, or black wattle, the bark of which is exceedingly rich in tannin; and, as in most other towns farther north on the east coast, the abundance of tallow encourages soap and candle industries.

N.B.—Saddlery is the most important 'leather' product, and the famous 'Bushmen's' saddles are made of kangaroo leather.

- (3) Sydney, again, is the chief centre of furniture-making, the east of N.S.W. supplying abundance of cedar for ordinary purposes, as well as other woods, *e.g.* tulip-wood and rosewood, for fine cabinet work. Most of the large towns, especially in Victoria and South Australia, make agricultural machinery.

- (4) Apart from the reduction of ores on the various metal-fields, and the coining of money in Sydney and Melbourne, there are few metal industries; but there are iron-foundries at Lithgow and Illawarra.
- (5) Sugar is refined in the coast towns north of Grafton, *e.g.* at Mackay and Bundaberg; wine is made in N.S.W. (*e.g.* between Maitland and Tamworth), Victoria (*e.g.* between Stawell and Echuca), and S. Australia (*e.g.* round Adelaide); butter is a speciality in Victoria (*e.g.* at Benalla).
- (6) Small industries exist for the preparation of special products for export, *e.g.* the fur of the opossum, the dark-green eggs of the emu, the feathers of the lyre-bird, etc.

N.B.—The large towns have grown, not by absorbing rural population, but by attracting immigrants to supply the labour requisite to handle, *e.g.* enormous loads of wool-bales, at places convenient for shipment.

NEW SOUTH WALES.

1. THE boundaries of New South Wales are partly 'natural' and partly artificial.

- (1) The 'natural' boundaries are the 700 miles of coast along the Pacific Ocean from Point Danger to Cape Howe,—the Murray river in the south,—and the Barwan river and Macpherson Mountains in the north.
- (2) The artificial boundaries are lines of latitude and longitude.
- (3) The colony originally included the whole of Australia east of meridian 135° E. ; but it gave up its western area to the new colony of South Australia in 1836, its southern area to the new colony of Victoria in 1851, and its northern area to Queensland under similar circumstances in 1859.

N.B.—Norfolk Island and Lord Howe Island are dependencies of New South Wales.

2. The coast is well broken up by small bays and creeks, many of which do, or might, make excellent harbours.

- (1) The boldness of the coast necessitates care in the provision of lighthouses and pilot stations, and the character of the coastland causes many of the river harbours to be hampered by a bar, *e.g.* the Clarence—which is navigable for the 50 miles between Grafton and the mouth—empties through *Shoal Bay*.
- (2) The excellence of Port Jackson (*cf.* p. 5) has led to the neglect of the fine natural harbours of Botany Bay and Broken Bay, as the development of Newcastle has led to the neglect of Port Stephens.
- (3) The shore waters abound in fish, and Twofold Bay makes a splendid fishing centre; but the warmer waters farther north do not produce any very useful species of food-fish except oysters.

3. The surface of the Colony, which is about three times the size of the United Kingdom, may be divided into three distinct sections.

- (1) The coast district is a strip from 25 to 120 miles wide between the ocean and the 'Great Divide' of the Australian Alps, Blue Mountains, and Liverpool Range. It consists of low but steep and densely-wooded hills, divided by the rich alluvial valleys of short rapid rivers, which flood very easily and to an extraordinary height, *e.g.* 60 feet on the Richmond and the Hawkesbury.
 - (2) The Mountain, or Tableland, District rises abruptly from the Coast District, and stretches inland for about 200 miles at a height of about 2000 feet. The rainfall in the east is heavy enough to make agriculture very profitable, especially on the areas of limestone and volcanic formation. Farther west there is only enough for pasture; and, though the dry bracing air is very favourable to sheep, there is great need for tanks and other means of storing water.
 - (3) West of the Tableland stretch the Plains, where the typical vegetation is generally of one of two kinds. Large areas are made almost useless by harmful indigenous plants, *e.g.* the spinifex, or prickly desert grass, the wallee, or the Murrumbidgee pine, which smother real 'grass' and shelter noxious animals, and spread very rapidly now that they are no longer burnt every year, as they used to be by the natives. Elsewhere salt-bush and various other shrubs supply abundant and very wholesome food for sheep, and the dry climate is exceedingly healthy.
4. The most important rivers rise on the western slope of the Dividing Range, and flow inland.
- (1) Their direction is largely decided by the tongue of high land which runs westwards from the Blue Mountains

section of the Tableland to the very banks of the Darling, and is even continued beyond the Darling in the Lyell and Grey Tablelands.

- (2) North of this strip of high land, most of the rivers, *e.g.* the Namoi and Macquarie, drain northwest—into the Darling; south of it, most of them, *e.g.* the Lachlan and Murrumbidgee, drain south-west—into the Murray.
- (3) The northern rivers are entirely rain-fed, and are subject to severe floods in the rainy season, with the result that the Darling is navigable for 1700 miles; but, as the northern mountains are far below the snow-line, the rivers dwindle down to a series of—often dry—‘water holes’ in the dry season.

N.B.—Railways to Bourke and Cobar, *via* Nyngan, afford some means of relief during the terrible droughts. Cf. the lines to Condobolin, Forbes, Hay, etc.

- (4) The southern rivers flow from higher mountains, and are partly snow-fed, so that they are much more constant in depth and volume; but even the Murrumbidgee, which is navigable for 500 miles during the rainy season, almost runs dry in summer.

N.B.—Nearly two-thirds of all the sheep in the Colony are fed in the basins of these southern rivers.

5. The vegetation is typical of all Australia, and varies enormously with access to supplies of water.

- (1) The only valuable indigenous vegetation is in the form of timber and ‘grasses’; both the natural grass and the salt-bush provide excellent food for sheep, and the timber is strong and beautiful, *e.g.* cedar, eucalyptus, and acacia.

N.B.—Lucerne grasses are being sown in the dairy districts south of Sydney and in the Murray basin.

- (2) Wheat grows well on the Tableland of the upper Murray basin, which combines the advantages of a 2-foot rainfall and easy irrigation with good railway accommodation; and tobacco flourishes in the same district—on the lime-stone.

- (3) Maize thrives in the damp heat of the low alluvial valleys on the N.E. coast, especially along the Macleay; and the same valley, like the valleys of the Clarence and the Richmond, grows sugar-cane. Pepper-mint and other economic plants grow wild.

N.B.—The Albury raisins and the Parramatta oranges are of exceptionally good quality.

6. The distribution of population on the Plains depends entirely on the water supply.

- (1) The chief northern centres—except mining towns such as Broken Hill and Cobar—are near the confluences of rivers, *e.g.* Wallgett and Narrabri; and their importance depends on the permanence of the flow, Bourke being much the most important.

N.B.—Wilcannia commands the depression by which the Darling crosses the central strip of high land, *cf.* §4 (1).

- (2) The centres in the south stand either at confluences, *e.g.* Condobolin and Wentworth, or along rivers from which irrigation is easy, *e.g.* Hay and Deniliquin. In the latter case, the constancy of the water-supply, the spread of railways, and the richness of the soil—from which the fertile elements have never been washed by rain or exhausted by plants—are leading to the spread of arable farming.

7. The distribution of population on the Tableland varies with the latitude.

- (1) In the north, *i.e.* on the Liverpool 'Plains' and the New England Tableland, it was largely decided by the mineral wealth, *e.g.* the tin of Tenterfield and Vegetable Creek, and the gold of Tamworth and Armidale; but fine wheat is now being grown between Armidale and Tamworth, and the latter—like its neighbour, Werris Creek,—is a railway junction.
- (2) In the west of the central portion, *e.g.* at Dubbo and Forbes, as at Mudgee, sheep-rearing is the chief attraction; but farther east the combination of rich soil and sufficient rain with alternation of dry cold winters and

dry hot summers encourages the production of wheat, especially between Bathurst and Orange.

N.B.—Coal and copper are mined at Dubbo, and coal and iron at Lithgow; and Bathurst was the original centre of the N.S.W. gold-mining.

- (3) Mixed farming is predominant in the south, *e.g.* round Goulburn and Yass; and, where there is a sudden change in the level of the country along with a reliable water supply, very important transport and agricultural centres, such as Albury and Wagga-Wagga, have sprung up.

8. The population on the Coastlands is mainly concentrated in the centre, especially at Sydney and Newcastle (*cf.* p. 5).

- (1) The moist, even climate and fertile soil of the metropolitan lowland make it exceedingly productive of fruit, *e.g.* the oranges of Parramatta and Penrith, and such cultivated grasses as lucerne, *e.g.* at Richmond.

N.B.—The difference between the average winter and summer temperatures near Parramatta is only 17 degrees.

- (2) The high, sheltered south bank of the Hunter grows excellent grapes, especially round Maitland; the lowlands produce quantities of maize and lucerne, especially between Maitland and Singleton and between Stroud and Port Stephens. Fine timber also grows behind Stroud. (*Cf.* the tree-ferns.)
- (3) There are famous cattle pastures along the Richmond and Clarence rivers, especially near Casino and Grafton; and the rainfall is so heavy (70 inches) that both valleys export good timber, mainly from Ballina.

QUEENSLAND.

1. THE coast is so much broken that there is a large number of good harbours.

- (1) The Gulf of Carpentaria is not very deep ; but Port Musgrave and Normanton are useful river-harbours, and the large area of water sheltered by the Wellesley Islands makes an excellent roadstead.
- (2) Sandbanks and coral reefs make the navigation of the Torres Strait rather dangerous ; but the rest of the Prince of Wales Islands form a natural breakwater round Thursday Island, which has a magnificent harbour in Port Kennedy.

N.B.—The coral 'shallows' swarm with edible and pearl oysters, sea-slugs, sponges, and very fine turtles.

- (3) Shifting sands and banks also interfere with the approaches to Brisbane and Maryborough ; but Moreton Bay receives six more or less navigable rivers, is partly sheltered by Moreton and Stradbroke Islands, and has convenient supplies of coal at Ipswich.
- (4) Central Queensland has a number of good ports. Port Curtis is one of the best harbours on the Pacific coast of Australia, and there is fairly good coal within easy access of Gladstone ; Rockhampton has a deep-sea harbour in Port Alma, and commands easy routes inland by rail and road ; and Broad Sound and Shortwater Bay are sheltered from the S.E. gales.
- (5) The chief N.E. ports are Townsville, Cairns, and Cooktown. Townsville is a fairly good artificial harbour, but its superiority over the deep and large harbour of Bowen on Port Denison is due to its easier access to the great mining centres of Ravenswood and Charters Towers ; Cairns, under the lee of Cape Grafton, commands the tin trade of Herberton ; Cooktown has a fairly good harbour on the estuary of the Endeavour river.

2. The surface of Queensland is more varied than that of any other equal area of Australia.

- (1) The main reason for this is that the Great Divide recedes from the Pacific coast in the latitude of Brisbane, which causes the main water-parting to be much farther inland than in any of the other colonies.
- (2) The total area is at least a dozen times that of England ; and, as it stretches over 19° of latitude, it has also considerable variety of climate.
- (3) The large area and the consequent variety of climate lead to some political difficulties. The northern peninsula, with its extreme heat, has tropical vegetation, and its planters want cheap coloured labour and 'Protection' for their sugar ; the southern continental area, with its 'temperate' climate, attracts White miners, squatters, and dock-labourers, who want cheap sugar and no 'alien' labour. (Cf. the disconnected railway systems.)
- (4) This temperate region consists of a large tableland, which is high enough (2000 feet) to have a fairly cool and bracing climate ; and it provides excellent sheep pasture, especially on the Darling Downs.
- (5) The tropical region is a mass of gullies and ravines, so low and damp as to be exceedingly unhealthy ; but the rock is full of minerals (including opals), and the soil and climate are favourable to tropical agriculture.

3. Owing partly to the height and partly to the great proportion of sea-board, the climate is more even than in any of the other colonies except Tasmania ; but the rainfall is very uneven.

- (1) The heaviest rainfall is on the Bellenden Ker Mountains, which have the highest peaks in the colony (5000 feet), and are very near the sea, and against which for more than half the year the S.E. 'Trades' blow off the warm East Australian current.

- (2) Even on the Pacific sea-board, however, where the coast-land is too low to make a good condensing medium, *e.g.* between Brisbane and Rockhampton or between the mouth of the Burdekin and Townsville, the rainfall is sometimes scanty.
- (3) Along the west of the Great Divide, from the Darling Downs to the Carpentaria lowlands, there is generally a rainfall of over 2 feet. This is quite sufficient for general pastoral purposes in the south, as a rule, and feeds such important tributaries of the Darling as the Condamine and the Barwan; but north of the Tropic it admits of nothing but sheep-farming.
- (4) The extreme south-west is almost rainless; and the 'creeks' of the Lake Eyre basin have to depend on the exhausted N.W. monsoons from the Indian Ocean or on occasional storms on the Selwyn and Grey uplands.
- (5) The colony does not suffer in the dry season from the terrible 'brick-dusters,' or simoon winds, which are such a scourge in other parts of the continent.

4. The rivers are of two main kinds—coastal and continental.

- (1) As the mountains are not high enough to be snow-capped, all the rivers depend more or less entirely on rainfall; and this depends on height and nearness to the coast.
- (2) Where the rainfall is abundant, *i.e.* where height and nearness to the coast are combined, there are numerous rivers; but they are naturally too short, too rapid, and too liable to sudden floods, to be of much use for traffic.
- (3) The continental rivers, on the contrary, have such a long and gradual descent that their current ought to be very slow; but the deficiency of rain entirely neutralises this advantage.

N.B.—Some of the continental rivers are invaluable for irrigation, and the cretaceous rock in the west of the colony is a great source of artesian springs.

5. The vegetation includes almost every kind of temperate and tropical plants.

- (1) The most valuable indigenous vegetation is in the form of various grasses, *e.g.* the Mitchell, which can endure long droughts, and recover from them with miraculous rapidity after quite a small rainfall. They are found along the west of the Great Divide, and are responsible for the large wool trade along the *Southern and Western Railway*, *e.g.* at Toowoomba, Roma, and Charleville. (Cf. the wool trade along the west section of the *Northern Railway*, *e.g.* at Hughenden and Winton.)

N.B.—Fear of drought prevents large flocks being kept in any one place, unless there are artesian wells.

The ranker grasses to the east of the Great Divide, especially along the *Central Railway*, are responsible for the meat and tallow trade of Rockhampton and dependent towns, *e.g.* Emerald, Clermont, and Spring-sure. (Cf. the great meat-preserving works of Gladstone.)

- (2) The indigenous timber is more varied than in the other colonies, the monotonous 'gum-tree' not being so ubiquitous. There are several kinds of pine, including the kauri, and such valuable 'furniture' woods as the tulip-tree and bamboo-cane. Port Douglas has a special trade in red cedar.
- (3) The coastlands produce in profusion maize, sugar-cane, and tropical fruits, especially bananas and pine-apples. The maize is a special product of the alluvial lowlands between Brisbane and Rockhampton, as the sugar is of the fertile marl between Herberton and Geraldton, and as the pine-apples and bananas are of the Cairns district. Oranges flourish in the south-east, and the volcanic areas of the Darling Downs produce excellent grapes for wine-making.

N.B.—Rice, cotton, arrowroot, and tobacco also thrive; but their cultivation, like that of the sugar, is complicated by a 'labour question.'

6. The distribution of population is as uneven as the rainfall, with which it is connected.

(1) The temperate climate, the large area of low, well-watered land, and the presence of coal, have combined to concentrate about one-third of the population in the Metropolitan District. Brisbane itself depends entirely on the pastoral and agricultural wealth of the Darling Downs—the wool of Charleville and Cunnamulla, the wheat of Warwick and Toowoomba, and the wine of Toowoomba and Roma ; and Ipswich has a small tweed industry.

(2) The central coastlands contain a number of small towns, of which the great meat and gold port of Rockhampton is the chief. The fine timber of the Mary Valley, the Gayndah cattle pastures, and the Gympie goldfield account for the importance of Maryborough ; the volcanic alluvium of the Burnett lowlands make Bundaberg a great sugar centre. (Cf. Mackay.)

N.B.—The development of Gladstone, in spite of its excellent harbour, has been hindered by the difficult communication inland. (Cf. Cardwell.)

(3) Farther north the important centres—besides those already mentioned—are all mining camps, *e.g.* Marytown and Maruba, Chillagoa and Etheridge, Croydon and Cloncurry.

VICTORIA.

1. THE Murray river and the Southern Ocean give Victoria a large proportion of 'natural' frontier, which is, however, less useful than it looks.

- (1) In summer (Christmas) there is not enough water in the Murray river for navigation, much less for any protection against the dusty simoons from the desert ; and in winter the river is subject to floods which are dangerous to shipping, and do great harm to the riverside farms.
- (2) In the south, the softness of the rock in many places and the heavy ocean-swell have caused the coast to 'weather' away into groups of small islands and submerged rocks, *e.g.* in Bass Strait, and into stretches of shifting sands, *e.g.* along the 'Ninety-Mile Beach.'
- (3) Where the formation is old and hard, it has been able to resist the weathering influences, and remains in magnificent cliffs, *e.g.* in the granite foreland of Wilson Promontory—which, with such islands as King and Flinders, marks the original geological link between Tasmania and the mainland.
- (4) The splendid bay of Port Phillip compensates, however, to a large extent, for the defects of the coast elsewhere. The tide rushes in with tremendous force through the narrow opening, but this very narrowness converts the 800 square miles of the bay into an ideal land-locked harbour ; and the estuaries of the rivers which empty into Hobson's Bay and Corio Bay required very little engineering to make admirable ports.
- (5) The coast to the west of Port Phillip has several useful little roadsteads, *e.g.* Warrnambool and Port Fairy, the best of which is Portland—under the lee of Point Danger.

- (6) Eastward of Port Phillip, Western Port has a fishing station in Hastings, with direct rail—through the fishing station of Frankston—to the Metropolis; and Port Albert is the headquarters of the fishing industry of the colony.

N.B.—The Gippsland 'Lakes' behind the Ninety-Mile Beach are generally more or less navigable.

2. The surface is thoroughly typical of Eastern Australia, consisting of Coastland, Dividing-Range, and Continental river-system.

- (1) The coastland from Cape Howe to the Glenelg river is usually less than 500 feet above the sea; and in Gippsland, where the rocks are comparatively new and soft, and the height of the Alps causes heavy precipitation from the wet S.E. winds off the Pacific, the soil is very rich and densely timbered.
- (2) The Dividing Range, which reaches in Bogong and Feathertop a height of over 6000 feet, forms a more or less continuous barrier of some 4000 to 5000 feet across the whole colony; but a number of deep transverse valleys give fairly easy access between the coast and the interior, *e.g.* between the Great Dividing Range proper and the Pyrenees, and between the Pyrenees and the Grampians.
- (3) The interior is of very old formation, and most of it consists of 'Wimmera' scrub-land, where mallee bushes grow in dense thickets infested with rabbits.
- (4) In a great many parts of the country, this very old formation is broken by volcanic areas, a conjunction which almost always implies the existence of gold in large quantities; and the weathering of rock of such various kinds produces a soil capable of producing a great variety of plants.

N.B.—There is a double line of over 20 extinct volcanoes running from Lake Corangamite to Ballarat.

- (5) Hills, valleys, and plains alike in these volcanic areas are covered with grass, which affords the best sheep pasturage probably in the world.

3. The climate is more temperate than that of any other part of Australia.

- (1) Even in the Wimmera District, where reclaimed mallee-land is generally devoted to wheat, the rainfall is fairly certain (15 inches); and, as two-thirds of it comes in spring, it is usually sufficient for agriculture.
- (2) Even in Gippsland, on the other hand, the rainfall seldom exceeds 30 inches, and there is almost constant sunshine even in July.
- (3) Dust-storms occur after spells of exceptional heat (above 100°) about Christmas-time, but are of short duration and generally bring rain.

4. The rivers, as in other parts of Australia, are of two kinds—coastal and continental.

- (1) Owing to the nearness of the Great Divide to the sea (50 to 70 miles), the coastal rivers are numerous, but short. Even the Glenelg, which is much the longest, is not more than about 200 miles; and the Yarra, which is the only one that is really navigable, is not more than 150.
- (2) Owing to the comparative lowness of the water-shed, the continental rivers are slow, but usually far too shallow for navigation. The Goulburn is the only tributary of the Murray which is of any real use for navigation; and the western rivers seldom reach the Murray at all, drying up in the clay-pans of the so-called Wimmera 'Lakes.'

5. The vegetation includes important forest, pastoral, and agricultural products.

- (1) Most of the trees are species of eucalyptus, the 'Red Gum' being the most valuable; and the chief forests

are on the Grampians and in Gippsland. There are several species of acacia, the wattle being the commonest and most useful (for tanning purposes).

- (2) At least half the colony is covered naturally—over hill, plain, and valley—with exceedingly fine grass. The low coastal pasture, especially in Gippsland, is devoted mainly to cattle; and in the same division a great number of horses are raised—for cavalry mounts in India. But the special product hitherto has been wool, though the dairy products are rapidly becoming very important.
- (3) The chief agricultural products are wheat and fruit. In a good, *i.e.* fairly wet, season many square miles of the old 'mallee country' are under wheat; and magnificent fruit is raised on the large areas of friable shale and volcanic formation. The dry heat is peculiarly favourable to the sun-curing of raisins; and, with irrigation, *e.g.* at Mildura and Echuca, all kinds of fruit thrive—apricots and peaches, oranges and lemons, figs and grapes.

6. About one-third of the total population is concentrated in Melbourne, but there is a large number of small towns.

- (1) In the north-west such towns are almost always farming centres, *e.g.* the irrigation 'colony' of Mildura and the railway junctions of Murtoa, Horsham, and Dimboola, Kerang, Korongvale, and Inglewood.
- (2) In the north-east there is more variety. Gold-mining and forestry are important round Beechworth; raisin-curing is a specialty at Mooroopna (Shepparton) and Rutherglen; Benalla is a very busy dairy centre (*cf.* Heathcote); Echuca is a great intercolonial junction and wool store; Wangaratta has flour mills and tobacco works.
- (3) The south-east, or Gippsland, district is the chief stock-farming area of the colony; but the richness of the

soil is greatly encouraging agriculture. Sale is a dairy centre, with extensive 'anchovy' fisheries in the lakes; Bairnsdale is a hop-growing centre, and Maffra a great cattle-market. Like the rest of the colony, this district is well provided with railways, cf. the little junctions of Traralgon and Warragul, Karumburra and Morwell.

N.B.—Coal (of poor quality) has been found along the line from Morwell to Mirboo.

- (4) The south-west contains the richest land in the whole colony. In the lower Glenelg basin the centres are chiefly cattle-markets, *e.g.* Castulon and Coleraine; between Port Fairy (Belfast) and Warrnambool magnificent crops of potatoes are grown, and Warrnambool is also famous for its yellow sandstone; very heavy crops of onions, peas, and beans are raised between Geelong and Queenscliff; and there are several important little railway junctions in other agricultural and pastoral districts, *e.g.* Hamilton, Koroit, and Terang.
- (5) The chief mining towns are on or near the Pyrenees—in the rough triangle of land enclosed by Eaglehawk, Stawell, and Ballarat. The more rapid exhaustion of the alluvial gold, *e.g.* at Ballarat, has led to a greater development of agriculture there, especially the cultivation of the vine, than in the quartz district, *e.g.* at Bendigo; but the connection of the gold-mining with areas of volcanic formation encourages agriculture generally, *e.g.* round the junctions of Ararat and Maryborough.

SOUTH AUSTRALIA.

1. THE entirely artificial character of the land frontier is appropriate to a colony which was at first a deliberate experiment in colonisation.

- (1) The name is a survival of this original plan ; but, as the acquisition of the Northern Territory in 1863 gave the colony more land *north* of latitude 15° S. than is found in any other of the colonies, '*South* Australia' is a peculiarly inappropriate title now.

2. The south coast is marked by some curious contrasts.

- (1) For 120 miles in the west it consists of a precipitous line of cliffs averaging 500 feet in height ; and, though there is safe shelter behind the Nuyt's Archipelago, *e.g.* in Denial, Smoky, and Streaky Bays, there is no easy communication inland.
- (2) Spencer Gulf, on the contrary, is not only the deepest indentation on the whole south coast of Australia, and navigable for its entire length, but it also contains a number of smaller bays, that of Port Lincoln giving safe anchorage in all winds.
- (3) The Gulf of St. Vincent is nearly as large as Spencer Gulf, and also contains smaller bays which provide good harbours, *e.g.* Largs Bay and Port Adelaide.
- (4) The shingle ridge of the Coorong shuts in a shallow lagoon (1 mile broad by 90 miles long) which teems with fish ; but its very existence is a significant comment on the value of the Murray estuary for navigation.
- (5) The two roadsteads of Beachport and Kingston serve fertile farming land in the south-east.

3. The north coast, both in form and in climate, shows the effect of exposure to tropical winds and seas.

- (1) The size of several of the islands, *e.g.* Melville, Bathurst, and Groote Eylandt, guarantees shelter from tropical storms; and the number of more or less navigable rivers, *e.g.* the Victoria, Daly, and Roper, offers facilities for transport inland. Cf. Port Darwin, p. 4.

4. The general surface of the colony is not typical of the continent, and so presents strong contrast to that of the other colonies.

- (1) The chief mountains, *e.g.* the Lofty and Flinders ranges, do not run parallel with the coast; and, therefore, they do not cut off ocean winds from the interior, except so far as the low Gawler range catches the occasional westerly winds off the Great Bight.
- (2) The highest, though not the most important, ranges—the Macdonnell and James—are in the very heart of the interior; and proper conservation of the heavy rains which occasionally fall there,—(the amount of which may be gauged by the size of Lake Amadeus, and the abundance of animal life in Larapinta Land),—might lead to wonderful developments as soon as the railway is extended northwards from Oodnadotta.
- (3) The geological formation is exceedingly varied; and the occurrence of a rich volcanic area northward from Mount Gambier—itsself an extinct volcano—where the climate is most favourable to White men, is a great incentive to agriculture.
- (4) Even the desert and semi-desert areas are not quite like those of the other colonies, mainly owing to the number and size of the lakes, *e.g.* Eyre, Gairdner, and Torrens.

N.B.—Lake Eyre, though liable to be completely absorbed or evaporated during drought, expands to 4000 square miles in the wet season.

5. The climate of such a large area, extending over so many degrees of latitude, naturally varies considerably.

- (1) The Northern Territory has a typical tropical climate, with wet (October to April) and dry seasons, and an average rainfall at Palmerston of about 5 feet.
- (2) The central area is exceedingly dry, though the actual rainfall at Alice Springs (the central telegraph station) is 11 or 12 inches a year; but the heat is tempered by the height, and there seems to be a very large supply of subterranean water, waiting only for artesian wells.
- (3) The south suffers in the middle of summer from intensely hot N. winds, and is subject to periodic droughts, which come at intervals of about 11 years; but the winter usually brings a rainfall of from 21 inches (at Adelaide) to 42 (on Mt. Lofty), and the prevailing S.E. wind tends to give a beautiful climate in spring and autumn.

N.B.—The spots on the sun attain a maximum at similar intervals of about 11 years.

6. South Australia has been the most agricultural of all the Australian colonies.

- (1) One reason for this is that, by the original scheme of settlement, the land was divided into blocks much smaller than were usually held in Australia, and too small for extensive pastoral farming.
- (2) Another reason is that the extent and shape of the south coast—*i.e.* the only coast of the original colony—brings much of the best land within reach of a rainfall sufficient for agriculture.
- (3) The extensive limestone plains along the coast are naturally suited to wheat, and the quality of the grain (in dryness and weight, and in 'strength' of flour) is exceedingly good; but the average yield per acre is so small, and the crop ripens so rapidly, that hand labour is both too costly and too slow for harvesting.

N.B.—The excellence of the local hops may also lead to a considerable development of brewing, especially in the barley district round Gawler.

- (4) The sea-board climate is well-suited to fruit, and very good olives and oranges are raised ; but the soil and climate, especially in the volcanic area in the south-east, are particularly favourable to the vine—both for wine-making and for raisin-curing.
 - (5) The agriculture of the Northern Territory includes the raising—by Chinese settlers—of sugar-cane, cotton maize, and tobacco.
 - (6) There are also considerable areas of pasture in the north—for cattle on the lower and ranker pastures, and for horses (Indian 'mounts') on the drier and sweeter ; but the chief pastoral product is Merino wool—from the south, where the climate is very healthy for sheep, though drought and dingoes and rabbits cause serious losses.
7. The mineral wealth seems to be less than in the other colonies, except in copper. Cf. p. 12.
- (1) Scarcity of water and labour in the south, and the vile climate and want of carriage in the north, have greatly interfered with the development of the minerals.
8. The mass of the population is concentrated in the south-east, where soil, climate, and facilities for transport (by sea, rail, and road) have encouraged systematic agriculture.
- (1) The metropolitan area contains more than 40 per cent. of the whole population—mainly, of course, in Adelaide itself, though there are some very popular 'suburbs,' *e.g.* Glenelg, Brighton, and Semaphore.
 - (2) South of the capital, the only important town is Mount Gambier, which has access by rail to the roadsteads of Kingston and Beachport ; but there are several 'sea-side' resorts on the shore of Lake Alexandrina, *e.g.* Milang and Goolwa, and on Encounter Bay, *e.g.* Port Elliot and Port Victor.

N.B.—Goolwa and Victor are fishing stations.

- (3) North of the capital, there are several 'gulf-side' towns of considerable importance besides the ports of Pirie and Augusta and the copper centres of Wallaroo and Moonta. For instance, Gawler and Kadina are wheat centres, Petersburg and Sooyoolie are busy junctions, and Morgan is a railway terminus on the direct route from Gawler to the irrigation colony of Renmark.
- (4) As the Eyre Peninsula is occupied almost entirely by sheep farmers, there are no towns except the one outlet of the area, the fine harbour of Port Lincoln.
- (5) Between Port Augusta and Palmerston the chief centres are the junction of Quain and the two termini of Pine Creek and Oodnadotta; and there are several small, but important, pearling-stations off the coast, especially on Melville Island.

WEST AUSTRALIA.

1. THE form and size of the colony give it a great length of coast, but there are few natural harbours.

(1) On the south coast steep limestone cliffs run along the shore for several hundred miles without any break which could possibly be called a natural harbour. Roadsteads may be constructed, *e.g.* at Esperance—to serve the Dundas goldfield; but King George Sound (Princess Royal Harbour) is the only real harbour.

(2) The shallow water, cross currents, and dangerous winds make navigation difficult on the west coast; but the fine inlet of Shark Bay is well enough sheltered to make the pearl fishery ('mother-of-pearl') safer than on any other part of the coast, *e.g.* at Cossack, and Fremantle has been immensely improved by harbour works.

N.B.—There are considerable deposits of guano on the Houtman Rocks; and the estuary of the Murray is famous for its mullet.

(3) Tropical hurricanes (in summer) and mangrove swamps make most of the north coast useless; but King Sound and Cambridge Gulf are fine natural harbours, though the great range of tidal level (generally about 40 feet) is a grave disadvantage to the port of Derby.

2. The surface reproduces the typical features of the continent in their least favourable form.

(1) In the west a double coast-range cuts off possible supplies of rain from the interior. The chief part of the outer range, the Darling Mountains, is not more than 1500 feet high; but it has a steep seaward face, and is within 20 miles of the sea, so that it forms a considerable obstacle to wet winds. The Stirling Range, 40 miles inland from Albany, attains a height of 3500 feet (= Snowdon).

- (2) Most of the rivers flow from the mountainous edge of the general plateau. In the south, where this is very near the sea, they are naturally short and very unequal in volume, the Swan being the only one of any size. Farther north, where the escarpment recedes from the coast, they are much longer, but—except the Fitzroy—of very little use for navigation.

N.B.—The Swan is navigable up to Guildford.

- (3) The interior is mainly a tableland, with large areas of real 'desert' in the Queen Victoria and Gibson Deserts. The latter is a more or less unbroken expanse of stones; but much of the Queen Victoria Desert, although absolutely without surface water, is covered with dense acacia 'scrub.'

N.B.—The so-called 'lakes' of the interior are mainly salt clay-pans.

3. The climate varies naturally with the latitude, but is in all parts remarkably healthy.

- (1) In the north, the year is divided into dry and wet (December to March) seasons; but even on the Kimberley mountains, *e.g.* the Leopold and Müller Ranges, the rainfall is not heavy enough to make the climate unhealthy, even for sheep.
- (2) In the south, the climate is peculiarly healthy and generally pleasant, with a winter rainfall varying from about 33 inches at Perth and 37 at Augusta to 9 at Coolgardie.
- (3) In the neighbourhood of the Tropic the heat and the dryness are intense inland, and the coastlands are subject to terrible hurricanes during the rainy months, especially north of the Tropic.

4. The most important plant products are timber and various grasses.

- (1) The forest wealth is concentrated in the south-west, and includes the famous jarrah—which, though easy to

work, is impervious to the teredo and the white ant—the karri (paving), and sandalwood.

N.B.—To be quite impervious and practically inflammable, the jarrah requires to be carefully selected from hill lots, cut in winter, and very well dried.

- (2) The pastoral areas are mainly in the north, especially in the rich valleys of the Ord and the Fitzroy. South of the De Grey river, soil and climate are equally favourable, but the land has been more or less overrun with poisonous plants except in the salt-bush lands of the Gascoyne Basin—which are not suitable for cattle.
- (3) The dry heat and constant sunshine guarantee good returns on fruit wherever there are permanent supplies of water; and both cereals and fruit are becoming important between Geraldton and Albany, especially round York and Northam.

5. Besides an enormous amount of gold, the mineral wealth includes coal, copper, lead, tin, and very hard diamonds.

- (1) The gold-fields run more or less continuously from N. to S. except for the strip of desert which runs from 129° E. to the Eighty-mile Beach; and they owe much of their prosperity to such rivers as the Murchison and the Gascoyne, the Ashburton and the Fortescue, and to the fact that much of the alluvial gold lay in nuggets on the surface of the ground.

N.B.—The influence of the desert is felt even off shore, cf. the large deposits of guano in the Looe Islands.

- (2) Coal has been discovered in several places, *e.g.* near Wyndham, Geraldton, and Bunbury; iron, of exceptional quality, is so abundant that it is said to interfere with the use of the compass; rich lodes of copper and lead are worked near Northampton; and stream tin occurs along the Blackwood, *e.g.* near Bridgeworth, and in the Roebourne district.

N.B.—The diamonds are used chiefly in glass-cutting.

6. The population is very much scattered, more than half being on the various goldfields.

- (1) The south-west is, however, much the most suitable for permanent settlement; and it contains a number of prosperous little towns, *e.g.* agricultural centres such as York and Northam, timber centres such as Bunbury and Busselton, and the industrial and commercial centres of Perth and Fremantle.

N.B.—The 'Fremantle' salt, made from the salt lakes of Rottnest Island, contains about 96 per cent. of pure chloride of sodium.

- (2) The Geraldton district is the next best for permanent settlement; the rainfall (29 inches) is sufficient to grow good wheat, *e.g.* between Dongara and Geraldton, and there is a busy farming population, *e.g.* round Walk-away.
- (3) There are several little railway junctions, *e.g.* Donnybrook and Jarrahdale, which are likely to become important centres as the colony develops. Albany, on the contrary, is suffering, and will suffer still more, from the development of Fremantle.

TASMANIA.

1. TASMANIA is peculiarly well situated for ocean traffic.

- (1) Situated at the confluence of the southern waters of the Indian and Pacific Oceans, in the latitude of the 'Roaring Forties,' it is far enough south to get the full benefit of the 'Brave West Winds'; and, at the same time, it is far enough north to be free from the climatic evils of the Antarctic Ocean.
- (2) The coast is generally bold and rocky, especially in the west; but it is well sheltered in many places by large islands, and well provided with good harbours, e.g. Port Davey and Macquarie Harbour.

N.B.—Flinders Island has an area of 800 square miles, and King's one of 400 square miles.

- (3) The two great commercial ports are Launceston and Hobart. Launceston, which is fed by coast traffic from such minor ports as Stanley and Burnie, naturally transacts the bulk of the trade with Melbourne; Hobart, though approached through the well-named *Storm Bay*, has a very safe as well as a very beautiful harbour, and there is a splendid 'refuge' for ships during bad weather in Port Arthur.

2. The general surface is very different from that of Australia, though the mountains are geologically part of the Great Dividing Range.

- (1) The average height is greatest in the centre of the colony, where there is a lake-strewn plateau of from 3000 to 4000 feet high. It has an area of about 60 miles by 50, with a steep escarpment on every side except the south; and it attains, in such peaks as Cradle

Mount, Johnstone Mount, and Mount Olympus, a height of about 5000 feet.

N.B.—The soft character of the rocks towards the S.E. is also shown by the deeply indented coast.

- (2) This central plateau rests, so to speak, on a lower and larger plateau, which follows roughly the direction of the coast, also rising in isolated peaks, such as Ben Lomond and the Frenchman's Cap, to about 5000 feet. Cf. Mount Wellington (over 4000 feet).
- (3) The lakes of this central plateau are all fresh-water, and feed rivers which never run dry.

3. The colony has in several respects a very marked resemblance to Scotland.

- (1) The total area is practically the same, and the area of special features is the same, *e.g.* the Great Lake is exactly the same size as Loch Lomond.
- (2) The absence of continuous ranges, and the intricate development of mountain and valley (due to the number and strength of the rivers) make the scenery exceedingly 'Scottish,' especially in the lake district.
- (3) The western half is made of old, hard rock, and the eastern of newer and softer rock; and between the two is the deep continuous valley of 'The Garden of Tasmania,' which has considerable resemblance to the 'Caledonian Canal.'

4. The colony has one of the most equable climates in the whole world.

- (1) The constancy and humidity of the "Brave West Winds," and the direction and warmth of the East Australian Current, guarantee unfailing supplies of vapour; and the height of the plateau, and the nearness of the escarpment to the sea, cause heavy precipitation, especially in the west.

N.B.—In the S.W. there is a more or less continuous rainfall, amounting to about 80 inches a year.

- (2) These marine influences entirely prevent any sudden or great changes of temperature, the winters being much less cold and the summers not much warmer than in England; and yet the nearness to the dry, hot continent of Australia causes the atmosphere to be much clearer and brighter than in England.
- (3) The climate of the Great Valley (with a rainfall of 30 inches) is peculiarly fine. Owing to the direction of the valley, warm N. winds—with their continental hardness mollified by their passage over the 150 miles of Bass Strait—can blow down it, and cool S. winds can blow up it.

N.B.—The delightful climate and the beautiful scenery have made the island the natural resort of Australians in summer.

5. The unfailing supplies of rain, and the character of the chief watersheds, guarantee a permanent river-system.

- (1) The Derwent, the most important river in the colony, is fed direct from Mount Olympus (4680 feet) through Lake St. Clair; and its chief tributary, the Ouse, flows from the Ironstone (4736 feet) part of the Great Western Mountains, and draws part of its water from the Great Lake.
- (2) The Tamar is fed by its Esk tributaries from Ben Lomond (5010 ft), and by its Meander and Lake tributaries from the Ironstone and Brady's Look-Out (4500 feet) sections of the Great Western Range.
- (3) Similarly, the chief western rivers flow from great heights, *e.g.* the Pieman from Mount Cradle (5069), and from areas of very heavy rainfall, *e.g.* over 80 inches on the water-parting between the Huon and the Gordon.

6. The soil and climate are very favourable to the production of all 'English' farm and garden plants.

- (1) The indigenous vegetation is mainly timber. The mild winter and the constant rainfall encourage dense forests

of eucalyptus ('Blue gum') and pine ('Huon'), especially in the south-west; and the wattle bark in other parts of the colony is very rich in tanning properties.

- (2) The pastoral area is naturally limited, but it is largely under artificial grasses, which make superb herbage in such a climate; and, consequently, special attention is paid to breeding, some of the finest stud animals—horses, cattle, and sheep—in Australasia being raised in Tasmania, chiefly in the northern counties of Devonshire and Dorsetshire.

N.B.—The predaceous marsupials known as the Tasmanian 'Devil' and 'Tiger' have been practically exterminated.

- (3) The soil and climate are also peculiarly well suited to roots and small fruit. Splendid potatoes and turnips are raised in the N.W., especially in the basins of the Mersey, Forth, and Leven; all sorts of 'berries,' especially strawberries and blackberries, are grown in the south; and the same area is becoming very famous for its apples and hops, mainly between Franklin and New Norfolk, though the flavour of the apples is impaired by the long voyage to England in chilled chambers.

N.B.—The mildness of the winter, and the bright sunshine in summer, are special advantages.

7. The mineral resources, though not very large, are varied, and include the most useful minerals.

- (1) The most abundant is tin, which is worked with extraordinary ease in the *quarries* of Mount Bischoff (Waratah) and other parts of the rainy N.W., and in the granite gullies of the N.E., *e.g.* at Branhholm and Ringarooma.
- (2) The chief silver mines are near Macquarie Harbour, *e.g.* Strachan, Zeehan, and Dundas, where the water-supply is as copious and constant as on Mount Bischoff.

N.B.—On Mount Lyell silver is found along with paying quantities of gold, copper, and antimony.

- (3) Coal of good quality is mined in quantities sufficient for the demand, *e.g.* in the tin-smelting of Launceston and the jam-factories of Hobart. Most of it comes from Fingal (with a coal-jetty at Seymour); other centres are Longford, Franklin, and Jerusalem (on the *Coal River*).

8. Nearly half the population of the colony is concentrated in the Hobart and Launceston districts.

- (1) Both Hobart and Launceston are situated amid very beautiful scenery (cf. the Cataract Gorge on the S. Esk), and form natural centres for the industries of their respective districts—Hobart specialising in various fruit industries (*e.g.* jam-making), and Launceston in smelting (*e.g.* the gold of Beaconsfield).
- (2) In the northern agricultural area the chief centres are Longford and Deloraine, Latrobe and Port Sorell. The last is the chief potato market; Latrobe is at the head of navigation on the Mersey, near coal mines and quarries of limestone; and Longford is in the most fertile part of the whole colony.
- (3) There are several other busy little railway centres, *e.g.* the junction of Conara and the fishing station of Ulverstone. Cf. Apsley and Scottsdale.

NEW ZEALAND.

General Geography.

1. THE colony of New Zealand consists of the remains of a large island which once existed 1000 miles E.S.E. of Australia.

- (1) Owing to volcanic action from time to time, and to centuries of 'weathering,' the mass of the original island has been sunk from 100 to 400 fathoms below the ocean level; and the only important remains are the 'North' and 'South' islands of New Zealand.

2. New Zealand is sometimes called 'the Britain of the south,' and there are some points of resemblance between the two countries.

- (1) The maritime position, long coast-line, division into two main islands, scenery, area, climate, and products are all points of considerable similarity.
- (2) New Zealand is, however, much the nearer to the nominal equator; its northern half is the hotter; it is much farther from the nearest land; it is in the centre of a water, not a land, hemisphere; and it draws some of its revenue from very different sources.

N.B.—Owing to the greater proportion of land north of the Equator, the thermal equator (or line of greatest average heat) is about 6° N.

3. Its latitude and general surroundings resemble those of Tasmania in the most important points.

- (1) It stands in the 'Roaring Forties,' where 'Brave West Winds' blow constantly over thousands of miles of sea; and this sea is warmed to the west of the colony, i.e. to windward, by equatorial currents. Consequently, the coasts of the colony are never blocked by ice.
- (2) The meeting of the cold Antarctic water with this warm equatorial water, the great length of the colony com-

pared with its breadth, and the division into two main areas by Cook Strait, cause the coast to be subject to severe gales.

N.B.—Stiff gales blow frequently, *e.g.* on 44 days in the year at Auckland and 67 at Wellington.

- (3) The actual coast-line is about the same length as that of Great Britain, and is so much indented that, even in the widest section of the colony, no part of the interior is more than 75 miles from the sea. There is also nearly always deep water close to the shore; but the harbours are very irregularly distributed.
- (4) In the west of the South Island, where the mountains abut directly upon the shore, the only fair harbour is Westport (under the lee of Cape Foulwind), but there are important—though bar-bound—estuaries, *e.g.* Greymouth and Hokitika, and the fiords of the south-west supply shelter. In the west of the North Island, where the mountains do not cut off communication inland so completely, drift sand and the westerly gales spoil the otherwise good harbours, *e.g.* Manukau and Kaipara.

N.B.—The latter are splendid sites for oyster beds.

- (5) On the east coast, where the islands themselves give shelter from the prevailing winds, there are a number of good harbours—from Russell in the extreme north to Invercargill in the extreme south. Port Nicholson has an unrivalled situation for home trade; Waitemata (Auckland) is one of the best harbours in the world; Port Lyttelton, though inferior to Akaroa as a natural harbour, has been made into an admirable artificial one; Port Chalmers was only impeded by a bar, which has been dredged away.

N.B.—Timaru and Oamaru are specially 'Canterbury' meat ports.

4. The surface presents some resemblance to that of Great Britain, especially in its distribution of mountains and plains.

- (1) The backbone of the colony is the double system of mountain ranges which run from the S.W. corner of the South Island to the N.E. corner (East Cape) of the North Island—hugging the west coast, as the Southern Alps, in the South Island, and trending towards the east coast in the North Island, as the Tararua, Ruahine, and Kaimanawa Ranges.

N.B.—A fork of the Alps, the Kaikoura Range, shows the eastward trend even in the South Island.

- (2) There is great variety of formation, and therefore great variety of mineral wealth; but there are certain features more or less typical of each island. The mountains in the north have an average height of less than 4000 feet (though Hikurangi reaches 5606), and their lower slopes are thickly wooded; those in the south have an average height of more than 8000 feet (Mt. Cook reaching 12,349), and their lower slopes—at all events in the east—are so open that they make splendid pasturage.

- (3) The great height of the Southern Alps, in such a latitude, causes a very heavy snowfall; and, as the snow-line is under 8000 feet, most of the range is covered with perpetual snow, and the high valleys are filled with immense glaciers—some larger even than any in Switzerland.

N.B.—The Southern Alps are thus a great barrier to communication.

- (4) In the North Island, west of the main system, there are three remarkable volcanoes—Ruapehu (9008 feet), Egmont (8260), and Tongariro (7511); and along the line of Ruapehu and Tongariro there is the famous Hot Lakes District.

N.B.—Ruapehu and the three-cratered Tongariro are still active; cf. the White Island cone in the Bay of Plenty.

- (5) The nearness of the mountains to one or other of the coasts accounts for the existence of the large plains—entirely to the east, i.e. to the leeward, of the

southern system, and mainly to the west, *i.e.* windward, of the northern. The most important of these are the Canterbury, Ahuriri, and Wairarapa plains.

5. Each island has a more or less typical river and lake system.

- (1) In the South Island the great height and the direction of the mountains, and their nearness to the sea, cause exceedingly heavy precipitation of rain and snow, from which a very large number of rivers are fed—some of them, especially the Clutha, having a volume out of all proportion to their length.
- (2) The position and character of the watershed, and the narrowness of the colony, make the rivers very rapid, subject to great floods, and very short—unless they flow more or less due north or south, *e.g.* the Clutha. They are, therefore, almost useless for navigation.
- (3) The natural dangers of the floods are largely minimised by the system of glacier-formed Alpine lakes, *e.g.* Te Anau and Wakatipu, which prevent any sudden flooding either from heavy rains or from melting glaciers; but the floods cause accumulation of shingle, change of course, and other costly inconveniences.
- (4) The general arrangement of the river system in the North Island is much the same as in the South Island, *e.g.* the longest rivers, such as the Waikato and Wanganui, must flow due north or south; and the presence of lakes, *e.g.* Lake Taupo, is a check on sudden floods.
- (5) On the other hand, the lower watershed and its greater distance from the wet winds cause a much smaller precipitation; and the absence of glaciers causes much more variation in the depth of water in summer. Even the Waikato, the longest river in the colony, is navigable for only some 50 miles, and that only by small boats.

- (6) The lakes, too, are of a very different character from those in the South Island. They are of volcanic origin, and most of them are surrounded by hot springs and mud-basins—some actually boiling—in which the Maoris bathe, wash their clothes, and cook their food. The largest of these lakes are Taupo, Tarawera, and Roto-Rua ; and Roto-Mahana is famous for its 'Pink and White Terraces.'

N.B.—The silica of the 'terraces' (deposited by boiling springs) was tinted by the presence of oxide of iron.

Climate and Products.

1. The climate is typically marine, the average range of temperature being very small (20°).

- (1) Of course, the mildest climate, with very slight range of temperature, is found along with the heaviest rainfall—on the west coast ; for instance, the rainfall at New Plymouth is double that at Napier, and that at Hokitika (120 inches) is nearly five times that at Christchurch.

N.B.—There are, as in all typical 'island' climates, very sudden changes of weather.

- (2) The actual rainfall, though generally greater than in the United Kingdom, is not so evenly distributed ; and the latitude and the absence of rain-clouds imply greater heat and a higher average of bright sunshine.
- (3) The mean annual temperature of the South Island is about the same as that of the south of England, while in the North Island it is about 5° higher. The greatest average heat, the least range of temperature, and the most even distribution of rain (about 2 days out of 5), are all at Auckland.

N.B.—The constant gales (cf. p. 45) prevent the heat from ever being oppressive, but are real climatic drawbacks, especially in Cook and Foveaux Straits.

2. Pasture, agriculture, and mining are all important industries, the pastoral products being particularly valuable.

- (1) The insular climate, large areas of volcanic soil, and hilly surface are most favourable to 'English' grasses; but much splendid timber has been sacrificed in the North Island—especially between Masterton and Kawhia—to make room for pasture, though the usual method of clearing—by fire—produced an ideal top-dressing for grass. Wool and 'frozen' mutton are the chief products, but dairy products are increasing.

Port Lyttelton, Timaru, and Oamaru are the special ports for 'Canterbury' mutton and lamb; but large quantities of 'frozen' meat are exported also from Auckland and Invercargill, and smaller quantities from Gisborne, Napier ('Hawke Bay'), and New Plymouth.

New Plymouth is also a dairy centre, exporting butter and cheese, partly collected from neighbouring centres on the line from Wanganui, *e.g.* Hawera. Dairy industries are also important round all the larger towns in the more temperate latitudes, especially Wellington (famous also for the Hutt Meat Works) and Christchurch (*e.g.* between Lincoln and Methven), *cf.* the butter of Gore and other towns near Invercargill.

Horse-rearing is an important industry in the North Island, especially between Mercer and Auckland and between Palmerston North and Wellington, and in the oats district of the South Island (Otago), *e.g.* between Lumsden and Gore. A good deal of hay is made in the same areas, especially round Mercer, *cf.* the export of hay from Napier.

- (2) Wheat flourishes on the warm, dry plains of Wellington and Marlborough; oats does best in the colder and damper climate of Canterbury and Otago; phormium, or native flax, grows along the low banks of the

Waikato ; forests cover the western shorelands of the South Island and the centre of the North Island, and the extreme north is especially famous for its Kauri timber and the fossil gum from the sites of old Kauri forests ; and all kinds of 'English' fruit thrive, the peaches of Nelson being superb.

N.B.—Barley is grown in both the wheat and the oats areas.

- (3) The chief coal mines are just behind the roadsteads of Westport and Greymouth, where the coal is of excellent quality, and coal is also found in large quantities in the Clutha basin, especially between Roxburgh and Clyde, and in the Waikato basin, *e.g.* round Mokau and Hamilton. Gold is found, especially round Reefton and Lyell, Kumara and Hokitika ; but it is also mined in the Coromandel peninsula and the Clutha valley, *e.g.* at Cromwell. Amongst the other minerals, iron sand (from the coast near Taranaki and Onehunga and from Stewart Island) and sulphur (from the Hot Lakes district, *e.g.* Rotorua) are the most characteristic.

3. Manufactures have been developed to a wonderful extent for so young a colony, and are naturally connected mainly with the three great occupations of grazing, agriculture, and mining.

- (1) With coal to the north, between Hawkesbury and Dunbuck, and to the west, *e.g.* near Outram, Dunedin has made special progress in manufactures. Besides handling (*via* Port Chalmers) much of the gold from the Clutha and Taieri basins, it makes mining and agricultural machinery, and uses the local wool in textile industries.
- (2) Christchurch handles a vast amount of frozen meat and a considerable amount of dairy produce through its fine artificial harbour of Port Lyttelton, and has a number of industries in connection with by-products—

e.g. bone-ash, hair, glue, and leather (boots and shoes). The last is specially important, because of the excellence of the (*e.g.* wattle) tanning materials.

N.B.—The native tanekaka bark is so valuable for dyeing kid-gloves that it is exported to France for that purpose.

- (3) Wellington handles a quantity of wool and frozen meat through Port Nicholson, and has growing textile (wool) and meat industries ; it has also local materials for pencil and peach-tinning works and for brewing (*cf.* the hops and barley of Nelson).
- (4) Auckland, with its twin harbours (of which Waitemata is the much better) and its command of railway traffic up and down the isthmus, is mainly a commercial centre ; but it has meat and furniture industries.

4. Stewart Island and the small dependencies of the colony are of very little importance.

- (1) The native name for Stewart Island—Rakiura (= 'Dry Weather Land')—is ironical. The constant rain encourages a dense growth of timber, and the sheltered east coast contains two fine natural harbours—Paterson Inlet and Port Pegasus. *Cf.* the fine 'refuge' of Camley Harbour in the Auckland Islands.
- (2) Of the eastward islands, the Chatham group—which contains a 'Pitt' island—contains some fair timber and sheep-pasture, and large areas of peat.
- (3) Of the northward islands, the volcanic Kermadec group has, naturally, rich soil and a beautiful 'marine' climate.

OCEANIA.

1. THE islands of the Pacific Ocean are generally grouped together under the name of Oceania.

- (1) This name is sometimes used to include also Australasia, *i.e.* the large British possessions in the South Pacific ; but it is better to restrict it to the islands lying in the central parts of the Pacific, *i.e.* east of the Moluccas.

2. This area is generally divided into three groups—Micronesia, Melanesia, and Polynesia.

- (1) Micronesia includes the 'Small Islands' in the west, mainly North of the equator.
- (2) Melanesia comprises the 'Islands of the Blacks' between New Guinea and Fiji (both inclusive).
- (3) Polynesia includes all the 'Many Islands' scattered over the rest of the Central Pacific.

3. They are really grouped along four definite lines of submarine elevation.

- (1) Two of these lines rise out of deep water, and the other two out of shallow water.

4. Northward from New Zealand the floor of the Pacific is raised in two great curves, which come to the surface in two lines of islands.

- (1) The eastern curve follows the line of the Fiji, Tonga, and Samoa groups,—the Micronesian archipelagoes (Gilbert, Marshall, and Carolines),—and seems to end in Gilolo.
- (2) The western curve follows the line of New Caledonia, the New Hebrides, the Solomon Islands, the Bismark group, and ends in New Guinea.
- (3) Politically, most of the islands are British, the French possessions coming next.

5. Both the inner and the outer islands are either of low coral or of high volcanic formation (cf. the Bahamas *v.* the Lesser Antilles in the West Indies).

- (1) The coral islanders have to work hard for their living, while the fertile volcanic islands encourage laziness and want of thrift. The special products of both are coconut and sago palms, bananas, and breadfruit. Samoa also exports cacao, pineapples, and limes; but Apia is a dangerous harbour.

N.B.—The best 'Samoan' port, Pago-Pago, belongs to U.S.A.

- (2) The Fijis are volcanic mountains, with admirable harbours behind barrier reefs; turtles and pearl oysters haunt the reefs, coco-palms and sugar plantations clothe the coast-lands, and the forested windward sides of the mountains produce immense quantities of very fine bananas. Sugar, copra, and bananas are exported from Suva (on Viti Levu) and Levuka, where there are large distilleries.
- (3) Of the French possessions New Caledonia is famous for its export of coffee, cobalt, and nickel, Noumea having a good harbour behind the island of Nou; and the New Hebrides have considerable trade in copra (for Marseilles), pearl and turtle shells, and bananas.
- (4) New Guinea is very well watered, and its largest river—the Fly—is tidal for 100 miles, and more or less navigable for 500. The coasts of the Gulf of Papua produce turtles, pearls, and sea-slugs; and the unhealthy interior produces gold and all kinds of tropical vegetation (including rubber), exported mainly from Port Moresby. The German territory is being cultivated for cotton and tobacco; and the Dutch coast is famous for sea-slugs, nutmegs, and bird-of-paradise feathers.

6. Besides these two lines of submarine heights converging on New Zealand, there are two similar lines along the two Tropics.

- (1) The northern centres in the Hawaii group. Besides commanding the commercial cross-routes of the central Pacific, this group has peculiar advantages of soil and climate. The ocean currents and the regularity of the N.E. 'Trades' give it a temperature about 10° cooler than any equal area in the same latitude; and the heavy rainfall covers the plains and valleys with fertile alluvium from the lofty volcanoes.

The coastal swamps grow immense quantities of rice, the abundance of fresh-water torrents making the quality very good; the sedimentary areas just behind these swamps, especially in Maui and Kauai, are devoted to sugar-cane—the staple-product; coffee and tropical fruit, especially bananas, are important in Hawaii, Kauai, and Maui; cattle and even sheep graze on the mountains.

The excellence of the Honolulu harbour, and its central position, make the comparatively small island of Oahu much the most important in the group; but most of the products come from Hawaii, though they are exported (*via* Hilo) from Honolulu.

- (2) The southern, or Paumotu, line produces a large quantity of copra, especially in the Tahiti group; and guano is collected from many of the small islands.
- (3) Among the smaller scattered elevations of the sea-bed the most important is that known as the Marquesas Archipelago.

THE EAST INDIES.

General Geography.

1. THE East Indian, or Malay, Archipelago is an immense region with considerable political unity, but distinct geographical divisions.

- (1) The political unity is due to the fact that the mass of the area belongs to the Dutch, and the mass of the inhabitants are Mongolian. The three great exceptions to Dutch dominion are in the British part of Borneo, the Portuguese part of Timor, and the old Spanish possessions now under the United States; and the main intrusion amongst the Mongolian Malays is of Ethiopian Melanesians.
- (2) The geographical division is decided by the very diverse physical and biological conditions found on the opposite sides of 'Wallace's Line'—i.e. the eastern edge of a very shallow submarine plateau, which runs along the east coasts of Bali, Borneo, and the Philippine Islands, up to Formosa. West of this line, the biological and physical features are closely akin to those of Asia, while east of it they are as closely akin to those of Australia.

N.B.—Out of 365 'Asiatic' kinds of birds found in Java and Borneo *only* 10 were found in Celebes; in Bali there were no opossums, cockatoos, or eucalyptus trees, and in Lombok there were no monkeys, woodpeckers, or bamboos.

- (3) The shallowness of the sea over this plateau shows that the western area of the archipelago formed part of the continent of Asia in more recent ages than the eastern area formed part of the old continent of Australia (cf. p. 6); and the special character of the fauna and flora in the Philippines, and the depth of the surrounding sea, show that they were separated from Asia

before the Greater Sunda Islands, as similar considerations show that Celebes must have been separated from one of the two continents—probably Australia—at a still more remote period.

2. The back-bone of the area is part of the great belt of fold-mountains which crosses the Old World from the Atlantic to the Pacific.

- (1) In many parts of the archipelago, as elsewhere, this belt divides rock of great age and stability, *e.g.* in Sumatra and Timor, from soft new rock of 'Tertiary' age.
- (2) Throughout the whole region, too, there is a perpetual recurrence of volcanic phenomena; a chain of cones, in different stages of extinction or activity, runs in a semicircle from Sumatra *via* Java to the Philippines.
- (3) The presence of volcanic debris over large areas of the Tertiary strata is largely responsible—under the heavy and constant rainfall—for the great fertility of the region.

3. The climate is everywhere tropical, and so is not subject to extremes.

- (1) Throughout a belt, about 300 miles broad, along the equator, rain falls at all times of the year, and there are no distinct seasonal divisions.
- (2) Farther away from the equator the year is divided into wet and dry seasons, according to the 'Trades'; south of 'The Line,' therefore, the wet season is from November to March, and north of it—except in the Marshall Islands—from March to November.

N.B.—The N.E. 'Trades' extend from 26° N. to 3° N. in March, but from 35° N. to 11° N. in September.

- (3) Consequently, part of the Philippine group is brought within the region of typhoon winds; and, as these winds move north-westward (north of the equator) until they reach Temperate latitudes, the whole of the exposed area of the group—which lies generally N.W. and S.E.—suffers from them.

4. The distinction between the native flora and fauna in the two areas is very marked.

- (1) West of 'Wallace's Line' the palms and bamboos, the monkeys and tigers, the woodpeckers and pheasants are typical of Asia; east of it, the typical Australian features include the eucalyptus and the casuarina, the cockatoo and the bird-of-paradise, and various marsupials.

N.B.—The *casuarina* is so called because its twigs resemble the feathers of the *cassowary*—itself an 'Australian' bird found east of 'Wallace's Line.'

Climate and Vegetation.

1. As in the West Indies, almost all the islands are mountainous, but have low coast plains.

- (1) The mountains, as in the West Indies, run generally east and west—except in the Philippines; and their height varies up to 10,000 feet in the Philippines and 12,000 in Java.
- (2) The chain of active volcanoes which extends through the Philippines, along the Macassar Strait, and right through the Sunda Islands, resembles those of the Antilles.
- (3) The Thousand Islands, like the Bahamas, are entirely of low coral formation.

2. As in the West Indies, again, though all the large islands are in the Tropics, they have their tropical heat modified by their relief and position.

- (1) More than half of all the islands—indeed, more than three-quarters of most of them—is at least 700 feet above the sea; and the mountains provide innumerable sites for sanatoria, *e.g.* at Buitenzorg.
- (2) The daily sea-breezes and the periodical 'Trades' and Monsoons give great relief from the equatorial heat, and the clouds are a protection from the actual sun-heat in the wet seasons.

- (3) The proximity to the equator and the height of the mountains cause the rainfall to be very heavy and the wet seasons to be very long.

3. The soil is very fertile almost everywhere, partly from its nature and partly by accident.

- (1) Most of it, as we have already seen, is of volcanic origin, and therefore needs only heat and moisture to make it enormously productive.
- (2) In most of the islands, too, there is an immense accumulation of potash in the soil—in the form of vegetable refuse.

4. The hilly character of the islands aids the heavy rainfall to increase the natural fertility of the soil.

- (1) The rain washes down to the roots of the plants a large quantity of the carbonic acid, ammonia, and nitric acid of the atmosphere.
- (2) The porous volcanic soil sucks in the water before it can escape in surface floods.
- (3) The general slope prevents the water so absorbed from stagnating round the roots of the plants, and facilitates artificial drainage.

5. With such a soil and climate, the vegetation is naturally very luxuriant, and includes almost all tropical plants, sugar and tobacco being the most important.

- (1) Sugar has hitherto been the great staple, but the industry has been affected by the competition of beet-sugar, especially from Germany and France. Sugar is, however, a natural product of the soil and climate; it needs great heat and moisture, it is not injured by sea-winds, and it grows best on low alluvial deposits of volcanic soil where there is also lime. Java produces more cane-sugar than any other country in the world except Cuba, and the Philippines and Sumatra also produce large quantities.

- (2) Tobacco has ranked next to sugar in the past, as the plant requires a light sandy loam, very rich in lime and vegetable refuse, and a climate that combines considerable humidity with lowland heat; but it, too, is becoming of relatively less importance, and the recent political troubles in the Philippines have affected the industry. The best cigar-leaf has hitherto been grown in the Philippines (Luzon and Bisaya), and Manila is famous for its cigars; but good tobacco is grown in some of the other islands, especially Borneo and Sumatra.

6. In recent times, coffee has become the chief rival of the sugar and tobacco.

- (1) It requires great heat and moisture, with height and protection from storms.
- (2) As it is grown so largely for export, the plantations should be as near the sea as possible, *e.g.* on an island where the mountains hug the sea shore.
- (3) Java produces the largest amount, but the best quality comes from Timor and Celebes.

N.B.—Java and Madura also produce tea.

7. The other characteristic products include spices, drugs, and various palms.

- (1) The Moluccas or 'Spice Islands' produce cloves, nutmegs, and cardamoms; Borneo and Sumatra produce pepper.
- (2) Quinine comes from Java, and camphor from Borneo and Sumatra.
- (3) The sago palm grows in all the hot swamps, and the coco-nut round all the coasts.

THE PHILIPPINE ISLANDS.

1. THE Philippines have a total area about the same as that of the United Kingdom.

- (1) The extremely irregular outline, and the great average height of the coasts guarantee an excellent and well distributed supply of harbours ; but the violence of the Pacific billows, the terrible typhoons, and the accompanying strong tides, make navigation dangerous—at all events, during the equinoctial change of monsoon (April and October). Much the most important harbours are Manila, Iloilo, and Cebu.
- (2) The surface is exceedingly irregular, the predominant feature being the lines of volcanoes (extinct and active) which diverge from Apo (nearly 11,000 feet), in Mindanao, to meet at Taal (only 800 ft.), in Luzon. The intervening valleys are generally very narrow ; but in the large islands, Luzon and Mindanao, they widen out sufficiently to be called plains.
- (3) As the islands are the centre of the great Kamchatka—New Zealand line of volcanic action, they have been, and still are, subject to considerable disturbance, both volcanic and seismic ; and their formation includes a mass of eruptive rocks of all ages—from the very oldest (in the extreme north) to the newest (in the west and south).

N.B.—The most destructive volcano is Mt. Magon, on the Camarines peninsula.

2. The great variety of rock implies great variety of mineral and vegetable products.

- (1) The mineral wealth is undeveloped, but includes numerous deposits of metal of peculiar purity ; for instance, the iron of Luzon averages 75 to 80 per cent. of pure metal, and the sulphur of Leyte is equally famous for its purity. Amongst the most important minerals are

gold in the north of Luzon (especially in the Cagayan basin) and Catanduanes—copper in the same area of Luzon, in the Camarines district, and in the north of Mindanao (especially between Butuan and Surigao)—iron near Manila, in Panay and in Cebu,—and coal in the south of Mindoro, in the Dumaguete district of Negros (along with petroleum), in Cebu and Samar, and in the extreme south-west of Mindanao (especially near Zamboanga).

- (2) The latitude, the marine climate, and the influence of the Kuro-Shiwo, which runs along the islands, combine to favour the most prolific plant growth. The forests are of great extent and value, including teak and many of the finest cabinet and dye woods; all kinds of tropical fruit, spices, and flowers abound; and there are valuable species of 'textile' palm and plantain, the latter producing the famous 'Manila hemp.'
- (3) The low lands along the coast and in the narrow valleys produce this Manila hemp, sugar, and tobacco; and the shores are lined with coconut palms. Rice is grown where there are the best facilities for irrigation, especially on the sites of burnt jungle. The best tobacco is grown in the Cagayan valley (i.e. the least tropical part) of N. Luzon, but is shipped from Aparri to Manila for manufacture (mainly into cigars and cheroots); the best copra is shipped to Marseilles (for soap).

3. The islands are divided into three main political areas—'Luzon,' 'Visayas' or 'Bisaya,' and 'Mindanao.'

- (1) Luzon island is the most fertile as well as the largest in the whole group, and contains nearly half the total population. Except the old English capital of Bacolor, most of the little towns are on the coast, e.g. Dagupan and Lingayan, Balayan and Batangas; but they are all overpowered by their nearness to Manila.

The latter monopolises almost all the industries of

the whole group (cigar-making, sugar-refining, distilling, abaca fabrics), and most of the commerce, for which it has peculiar advantages in its magnificent harbour and its position with regard to the mainland of Asia. The site, however, though otherwise appropriate for a capital, is so swampy as to be very unhealthy, and is subject to destructive earthquakes.

N.B.—Palawan ('sluice-door') owes its name to its value as a natural breakwater between the China and Sulu seas.

- (2) The Visayas area stands next to Luzon in point of population; and Iloilo is the second city in the country, though Cebu is the capital of the local government. Sugar, 'hemp,' and perfumes (*e.g.* ilang-ilang, 'flower of flowers') are special products. The coal of Cebu, Negros, and Samar is excellent.
- (3) Mindanao ('Lake-country') is so much covered with forest and lakes (*e.g.* Dagum, Malanao, and Bulnan) that it is very thinly peopled; but it ranks next to Luzon in size, and seems to be rich in gold, mercury, and coal—the coal within fairly easy reach of the sea along the east coast and near the capital town of Zamboanga.

THE DUTCH EAST INDIES.

1. THOUGH not the largest island, Java is the most important because it is the most fertile.

- (1) The flat sands or steep limestone cliffs of the south coast, with the constant violence of the surge, are not favourable to navigation; but there is one good harbour—at Tjilatjap.
- (2) The low northern coast is much better supplied with harbours. The estuary of the Chilivung is so well sheltered by islands and sandbanks that the Batavia Roadstead was a most important commercial centre for 200 years before it was provided with its fine artificial harbour at Tanjong Priok; the shelter of Madura gives Soerabaya a splendid harbour on the fine estuary of the Solo; and Samarang, though not safe in westerly gales, is very convenient to the native capital of Soerakarta.

N.B.—Fish are abundant all round the coast.

- (3) The island is exceedingly mountainous, and it is the most volcanic area in the world; but there is a definite backbone of cretaceous mountain, largely overlaid by the mud thrown out by the volcanoes.

N.B.—There are more than 40 active volcanoes, a quarter of the number being at least 10,000 feet high.

- (4) With such a mountainous surface, the rivers are naturally of little or no use for navigation; but they help to distribute the fertile volcanic mud, and are very useful to agriculture, though they are subject to floods in the rainy season (November—March).
- (5) At least one-sixth of the island is covered with dense forest, including very valuable areas of teak; bamboos, coconut-palms, and various spices run wild in all directions; and the cultivated plants include sugar (mainly in the centre), coffee and tobacco (mainly in

the east), and indigo and tea (mainly in the west), as well as huge crops of rice and maize—the chief food of the Malay natives.

- (6) There is, of course, abundance of sulphur, and good coal is known to exist; but the only mineral of any importance at present is the salt, which, like the teak, is a Government monopoly.
- (7) Of the adjacent islands, Madura has rich salt mines; Krakatao was the scene of a terrible eruption, the effects of which were felt and seen even in England; and Bali exports from Buleleng the products of its fertile finely-irrigated soil, *e.g.* coffee and tobacco.

2. Sumatra resembles Java in many essentials, but is nearly four times as large.

- (1) The rocky west coast is sheltered in many places by large islands, *e.g.* Simalur, Nias, and Siberut; and there are several useful ports, *e.g.* Benkulen, besides the great harbour of Padang.
- (2) The fine bays of Semanká and Lampong offer special facilities for commerce apart from their command of the busy Sunda Strait; but Telok-Betong suffers from its proximity to Batavia.
- (3) The east coast is divided naturally into two parts. In the north, where spurs from the mountainous backbone of the island jut out into the Malacca Strait, it is of course high and rocky, *e.g.* round the Bay of Langsar; but farther south it is low and flat, and its chief ports are on dependent islands, *e.g.* Bangkalis and Muntok.
- (4) The high narrow mountain chain—the Barisan or Bukit-Barisan—which forms the backbone of the island, is of very old formation, but broken by numerous active and extinct volcanoes. It hugs the west coast for about 1000 miles, and is generally narrow; but in some places it consists of two or even three parallel ranges, and is buttressed by plateaus.

- (5) The position and character of this mountain system involve the presence of numerous short torrents on the west—large lakes amongst the mountains, *e.g.* L. Toba and L. Ranau—and long placid rivers, such as the Rokan and Siak, Kampar and Indragiri, Batang-Hari and Jambi, and Musi or Palembang, wandering over the wide alluvial plains to the eastward without strength enough to keep their estuaries free from sand-banks.
- (6) The position of the island on both sides of the equator gives it two sets of seasons, those in the north being the opposite of those in the south, with a belt of constant equatorial rainfall between the two. The mountains and plateaus are healthy, but the great heat and swampy surface of the eastern plain make it very unhealthy.

N.B.—Many of the houses in the town of Palembang ('the filter') are built on rafts.

- (7) The island is densely forested, gutta-percha and camphor being the most valuable forest products; Deli and Ranau are noted for their good tobacco; and quantities of pepper are grown in the Lampong district. Rich beds of good coal exist, especially in the Ombilin valley, which has a railway to Padang; and, as usual, where very old rock is broken by volcanoes, there is abundance of gold, especially in the Jambi and Palembang districts. And the islands of Banka and Bileton are very rich in tin.

3. Borneo, like New Guinea and Timor, is only partly Dutch.

- (1) As the island is crossed by the equator, it has, like Sumatra, two sets of seasons; but, unlike Sumatra, it has no volcanoes. Between its intricate mountains, it has a large amount of low, level land, threaded by navigable rivers, *e.g.* the Barito and the Kapuas, the Bulangan and the Redjang; and the great variety of

rock gives it a great variety both of minerals, *e.g.* coal and iron, gold and diamonds, and of vegetation, *e.g.* timber and resins, spices and drugs.

- (2) Dutch Borneo (= France) exports tobacco, sugar, and pepper,—edible-nests, sea-slugs, and gutta-percha,—teak, ebony, and rattans,—coal, gold, and diamonds (cut by natives in Pontianak and Martapura). The town of Bandjermassin, like that of Palembang, is built largely on rafts and piles; and, like the fellow port of Pontianak, it is a considerable distance inland—no small advantage to a harbour on a pirate-haunted coast.
- (3) British 'Borneo' includes the island of Labuan as well as the 'mainland' territories of North Borneo, Brunei, and Sarawak. It has better harbours than the Dutch area—most trade being done by Sandakan and Kuching (Sarawak)—and produces excellent camphor, tobacco, and coal. Coffee and pepper are also cultivated; its native vegetation includes all the plants found in the Dutch area; and sago is a specialty in Sarawak.

N.B.—The Portuguese area of Timor, which includes the Larantuka district of Flores, has a good port in Dilli.

4. Practically all the other islands are Dutch, Celebes and the Moluccas being the most important.

- (1) As the island-tipped peninsulas of Celebes are almost as mountainous as the central mass—'the body of the star-fish'—it is still comparatively unexplored, and the only parts effectively occupied are the Macassar and Minahassa peninsulas. Its special products are macassar oil (a tree sap), tortoise-shell (really turtle-shell), sea-slugs, pearls, spices, and coffee; but its height makes it so healthy that the Dongala district is even famous for horses. Macassar is the most important native mart in the whole archipelago.

N.B.—The fine Minahassa coffee is exported from Menado during the east monsoon, but from Kema during the west.

- (2) The Moluccas, or Spice Islands, are traversed by the great volcanic chain of the archipelago, many of the islands being volcanic cones, while others are coral reefs. The Amboyna group is famous for cloves, and the Banda group for nutmegs; Ceram exports sago; and the Australian character of the group is marked by the presence of, *e.g.* kangaroos.

N.B.—Compare the shape of Gilolo with that of Celebes.

- (3) The proximity of the Lesser Sunda Islands to the heated interior of Australia makes them very dry, horses and sandalwood again appearing as products, *e.g.* in Sumbawa and Sumba; but in the Portuguese area of Timor the rainfall is sufficient to grow coffee of superb quality.

APPENDIX

ON

THE EXTREME ANTIQUITY OF AUSTRALIA.

1. THE extreme antiquity of the Australian continent is proved by both geological and biological evidence.

- (1) Geologically it is one of the oldest areas of land in the world. The interior is, of course, largely unknown ; but there is sufficient evidence in the settled parts, *e.g.* the Eyre Peninsula, the Great Divide, the west of Tasmania, that vast areas of the soil belong to the earlier periods, *e.g.* Silurian, of the Palæozoic Era.
- (2) The Flora of the continent is almost equally archaic, including numerous kinds of plant life which were typical of the carboniferous period, and which have survived only through the extreme slowness of their process of adaptation to the increasing dryness of the climate. Myrtles, acacias, drought-loving conifers, baobabs, bottle-trees, are all found in more or less close neighbourhood.
- (3) The typical native animals further confirm the geological evidence of the extreme antiquity of the continent. They include not only a large number of marsupials, *e.g.* the kangaroo, phalanger ('opossum'), wombat, but also two kinds of egg-laying mammals, the duck-bill and the spiny echidna, whose semi-reptilian anatomy speaks of an era previous even to that of the marsupials.
- (4) The aboriginal people are also of an extremely primitive and degraded type ; and their social condition is that of the earlier Stone Age. The absence of milk-giving animals and of bread-giving grasses, no doubt, greatly contributed to the absence of any progress towards civilisation.

PROBLEM PAPER.

1. Discuss the probable effect on the development of New South Wales if the Blue Mountains had been 2000 feet higher than they are, and 200 miles farther inland.

2. Illustrate from East Australia and the Philippines the connection between race and occupation in the Tropics, and the relation of both to height.

3. Estimate the effect of using the water-power of the Southern Alps in textile industries.

4. Discuss the suitability of the East Indies for industries which do not require coloured labour.

5. Illustrate the circumstances which determine the position, growth, and characteristic industries of an important town.

6. What difference would it make to Australia if the equator was where the South Tropic is?

7. How far were Britain and Holland respectively good sources from which to draw colonists for Australia and the East Indies?

8. Estimate the influence of rivers in concentrating people and products at a few great centres, especially in countries which produce large quantities of 'raw material.'

9. Compare the political and commercial value of the various colonies of Australasia.

10. Discuss the probable effect on the islands in the south-west of the Pacific Ocean of the opening of the Panama Canal.

11. Estimate the effect of encroaching on the great deserts of Australia by the systematic planting of drought-loving trees and shrubs.

12. Compare the native animals of Australia with those of Asia, and try to account for their inferiority.

INDEX OF CHIEF PLACES AND SUBJECTS.

ABBREVIATIONS :

c. = cape, g. = gulf, i. = island, l. = lake, m. = mountain, r. = river, st. = strait.

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|----------------------------------|-------------------------------------|----------------------------------|
| Adelaide, 3, 30, 33. | Blue Mts., 16. | Cooktown, 5, 20. |
| <i>Agriculture</i> , 11, 17, 23, | Bogong, m., 26. | Coolgardie, 12, 36. |
| 28, 32, 42, 49, 53, | Borneo, 65. | Coorong, 30. |
| 58, etc. | Botany Bay, 1, 5, 15. | <i>Copper</i> , 12, 33, 37, 61. |
| Akaroa, 45. | Bourke, 9, 17, 18. | <i>Copra</i> , 53, 54, 61. |
| Albany, 3, 35, 38. | Bowen, 20. | Corangamite, 1, 26. |
| Albury, 9, 11, 18, 19. | Branxholm, 42. | Corio Bay, 25. |
| Alexandrina, 1, 33. | Brisbane, 4, 11, 20, 24. | Coromandel, 50. |
| Alice Springs, 32. | Broken Bay, 5, 15. | Cradle, m., 39, 41. |
| Alps, Australian, 7, 16. | „ Hill, 3, 13. | Cromwell, 50. |
| Alps, Southern, 46. | Brunei, 66. | <i>Dairy Products</i> , 11, |
| Amadeus, l., 31. | Bunbury, 37, 38. | 14, 28, 49. |
| Apia, 53. | Bundaberg, 11, 14, 24. | Darling Downs, 21-24. |
| Apo, m., 60. | Burdekin, r., 22. | „ m., 6, 35. |
| <i>Apples</i> , 42. | <i>Cacao</i> , 11, 53. | „ r., 17, 22. |
| Ararat, m., 11, 29. | Cairns, 5, 11, 20, 23. | Darwin, 4. |
| Armida, 18. | Camarines, 60, 61. | Deniliquin, 18. |
| Ashburton, r., 12. | Cambridge, g., 35. | Derwent, r., 41. |
| Auckland, 45, 49, 51. | Canterbury, 47, 49. | <i>Deserts</i> , 7, 31. |
| „ Islands, 51. | Cape York, 4. | <i>Diamonds</i> , 37, 66. |
| Bairnsdale, 29. | Caroline Islands, 52. | <i>Drugs</i> , 59, 65. |
| Bali, 54, 55, 64. | Carpentaria, g., 2, 20. | Dubbo, 18, 19. |
| Ballarat, 11, 12, 29. | Castlemaine, 12. | Dundas, 3, 12, 35. |
| Ballina, 19. | Catanduanes, 61. | Dunedin, 50. |
| Banda Islands, 67. | Cebu, 60-62. | Eaglehawk, 29. |
| Bandjermassin, 66. | Celebes, 66. | Echuca, 11, 28. |
| Banka, 65. | Ceram (Serang), 67. | Egmont, m., 46. |
| Barcoo, r., 8. | Charleville, 23, 24. | Emerald, 23. |
| Barisan, m., 64. | Charters Towers, 4, | Endeavour, r., 20. |
| Barrier Reef, 5. | 12, 20. | Esk, r., 41. |
| Barwan, r., 15, 22. | Chatham Islands, 51. | Esperance, 3, 35. |
| Bass Strait, 25, 41. | Christchurch, 49, 50. | <i>Eucalyptus</i> , 10, 42. |
| Batavia, 63. | Clarence, 2, 11, 15, 19. | Eyre, l., 21, 31. |
| Bathurst, 19. | Clermont, 12, 23. | „ Pen., 34. |
| „ r., 31. | <i>Climate</i> , 6-9, 21, 27, | Fiji Islands, 52, 53. |
| Beachport, 30, 33. | 32, 36, 40, 48, 57, etc. | Fingal, 43. |
| Beechworth, 28. | Cloncurry, 13. | <i>Fish</i> , 2, 4, 15, 26, 30, |
| Bellenden Ker, m., 21. | Clutha, r., 47, 50. | 35, 43, 45, 63. |
| Ben Lomond, 40, 41. | <i>Coal</i> , 12, 19, 43, 50, | Fitzy, r., 36, 37. |
| Benalla, 11, 28. | 61, 62, 65, 66. | Flinders, i., 25. |
| Bendigo, 12, 29. | Cobar, 12, 17, 18. | „ m., 31. |
| Bileton, 65. | <i>Coffee</i> , 11, 59, 63, 66, 67. | <i>Flax</i> , 49. |
| Bisaya = Visayas, 61. | Condobolin, 17, 18. | <i>Forests</i> , 49, 50, 63, 65. |
| Bischoff, m., 42. | Cook, m., 46. | Franklin, 42, 43. |
| Bismark, i., 52. | „ st., 45. | Fremantle, 4, 35, 38. |

- Frenchman's Cap, m., 40.
Fruit, 11, 18, 19, 23, 28, 33, 37, 42, 50, 51, 53, 61.
 Gairdner, l., 31.
 Gambier, m., 31.
 Gawler, 34.
 Geelong, 29.
 Geraldton, Q., 11, 23, " W.A., 37, 38.
 Gilbert Islands, 52.
 Gilolo, 52, 67.
 Gippsland, 12, 26, 28
 Gisborne, 49.
 Gladstone, 20, 23, 24.
 Glenelg, r., 26, 27.
Gold, 12, 19, 24, 26, 29, 37, 50, 61, 62, 65, 66.
 Goolwa, 33.
 Gore, 49.
 Goulburn, 19.
 " r., 27.
 Grafton, 14, 15.
 Grampians, m., 26.
 Great Bight, 2.
 " Dividing Range, 7.
 " Lake, 41.
 " Victoria Desert, 8, 36.
 Greymouth, 45, 50.
 Groote Eglantdt, 31.
Guano, 37, 54.
 Gympie, 12, 24.
 Hastings, 26.
 Hawaii, 54.
 Hawke Bay, 49.
 Hawkesbury, 2, 16.
 Hay, 17, 18.
Hemp, 61.
 Herberton, 5, 11, 20, 23.
 Hobart, 39, 43.
 Hobson Bay, 25.
 Hokitika, 45, 50.
 Honolulu, 54.
Horses, 11, 28, 33, 42, 49, 66.
 Horsham, 28.
 Howe, c., 15.
 Hughenden, 23.
 Hunter, r., 19.
 Huon, r., 41.
 Illawarra, 12, 14.
 Iloilo, 60, 62.
Industries, 13, 50, 61.
 Invercargill, 45, 49.
 Ipswich, 12, 20, 24.
Iron, 12, 19, 50, 60.
Jarrah, 36.
 Java, 63.
 Kadina, 34.
 Kaikoura, m., 46.
 Kaipara, 45.
 Kalgurli, 12.
 Kapunda, 12.
Kauri, 50.
 Kawhia, 49.
 Kimberley, 12, 36.
 King, i., 25, 39.
 King Sound, 3, 35.
 King George Sound, 3, 35.
 Kosciusko, m., 7.
 Krakatao, 64.
 Kuching, 66.
 Kumara, 50.
 Kuro-Shiwo, 61.
 Lachlan, r., 17.
 Larapinta, 31.
 Largs, 30.
 Latrobe, 43.
 Launceston, 39, 43.
Leather, 13, 28, 51.
 Leeuwin, c., 3.
 Leveque, c., 3.
 Lithgow, 12, 14.
 Liverpool, m., 16.
 Lofty, m., 31, 32.
 Lombok, 6, 55.
 Longford, 43.
 Lord Howe, i., 6, 15.
 Luzon, 60-62.
 Lyell, m., 42.
 Macassar, 66.
 Macdonnell, m., 8, 31.
 Mackay, 11, 14.
 Macleay, r., 18.
 Macquarie, 39, 42.
 " r., 17.
 Madura, 59, 63, 64.
 Maitland, 19.
Maize, 11, 18, 23, 64.
 Malacca, st., 64.
 Manukau, 45.
 Marlborough, 49.
 Marquesa Islands, 54.
 Marshall Islands, 52.
 Maryborough, 20, 24.
 Masterton, 49.
Meat, 11, 23, 49.
 Melanesia, 52, 53.
 Melbourne, 3, 28.
 Melville, i., 31, 34.
 Menzies, 12.
 Micronesia, 52, 53.
 Mildura, 11, 28.
 Minahassa, 66.
 Mindanao, 60-62.
 Mindora, 61.
Minerals, 12, 50, 60-66.
 Mokau, 50.
 Moluccas Island, 67.
 Moonta, 12.
 Mooroopna, 11, 28.
 Moreton Bay, 20.
 Morgan, 34.
 Mount Morgan, 12.
 Murchison, 12, 37.
 Murray, r., 7-9, 25.
 Murrumbidgee, r., 7, 17.
 Napier, 48, 49.
 Nelson, 50.
 New Caledonia, 52.
 " England, m., 18.
 " Guinea, 52, 53.
 " Hebrides, 52.
 " Norfolk, 42.
 " Plymouth, 48, 49.
 Newcastle, 12, 15, 19.
Nickel, 53.
 Norfolk, i., 15.
 Northam, 37, 38.
 Northampton, 13, 37.
 Northern Territory, 33.
 Noumea, 53.
 Nyngan, 17.
 Oamaru, 45, 49.
 Olympus, m., 41.
 Onehunga, 50.
 Oodnadotta, 34.
 Orange, 19.
Oysters, r., 15, 20, 45.
 Padang, 65.
 Pago-Pago, 153.
 Palawan, 62.

72 INDEX OF CHIEF PLACES AND SUBJECTS.

- Palembang, 65.
 Palmerston, 4.
Palms, 53, 59.
 Papua-New Guinea, 53.
 Parramatta, 11, 18, 19.
Pasture, 10, 49.
 Paterson Inlet, 51.
 Paumotu, i., 54.
Pearls, 4, 34, 35, 53, 66.
 Penrith, 19.
 Perth, 4, 38.
 Pine Creek, 34.
 Polynesia, 52, 54.
 Pontianak, 66.
 Port Adelaide, 3, 30.
 „ Albert, 26.
 „ Alma, 20.
 „ Augusta, 3.
 „ Chalmers, 45, 50.
 „ Curtis, 20.
 „ Darwin, 4.
 „ Denison, 20.
 „ Douglas, 23.
 „ Fairy, 25, 29.
 „ Jackson, 5, 19.
 „ Kennedy, 4, 20.
 „ Lincoln, 30.
 „ Lyttelton, 45, 49.
 „ Melbourne, 3.
 „ Nicholson, 45, 51.
 „ Pegasus, 51.
 „ Philip, 3, 25.
 „ Pirie, 3.
 „ Stephens, 5, 19.
Potatoes, 29, 42, 43.
 Prince of Wales
 Islands, 20.
 Princess Royal Har-
 bour, 35.
 Pyrenees, 28.
 Queen Victoria Desert,
 8, 36.
 Ranau, 65.
 Ravenswood, 5.
 Reefton, 50.
 Renmark, 11, 34.
 Richmond, r., 11, 16, 19.
 Ringarooma, 42.
 Rockhampton, 4, 11, 20.
 Roma, 11, 23.
 Roto-Mahana, 1., 48.
 Roto-Rua, 1., 48.
 Ruapehu, m., 46.
 Russell, 45.
 Rutherglen, 11, 28.
Sago, 66, 67.
 St. Clair, 1., 41.
 „ Vincent, g., 3, 30.
 Sale, 29.
Salt, 38, 64.
 Samar, 61.
 Samarang, 63.
 Samoa, 52, 53.
 Sandakan, 66.
 Sandhurst, 12.
 Sandwich Islands —
 Hawaii, 54.
 Sarawak, 66.
 Semaphore, 33.
 Shark Bay, 4, 35.
Silver, 13, 42.
 Silvertown, 3, 13.
 Soerabaya, 63.
 Soerakarta, 63.
 Solomon Islands, 52
 Spencer, g., 3, 30.
Spice, 53, 59, 63, 65, 67.
 Spice Islands, 67.
 Stanthorpe, 13.
 Stawell, 29.
 Stewart, i., 51.
 Stirling, m., 35.
 Strachan, 42.
 Stroud, 19.
Sugar, 11, 54, 58.
Sulphur, 60, 64.
 Sumatra, 64.
 Sunda Islands, 56, 67.
 Swan, r., 4, 36.
 Sydney, 13, 19.
 Tahiti, 54.
 Tamar, r., 41.
 Tamworth, 13, 18.
 Tanjong-Priok, 63.
 Taranaki, 50.
 Taupo, 1., 47.
 Te Anau, 1., 47.
Teak, 61, 63.
 Telok-Betong, 64.
 Tenterfield, 18.
 Thursday, i., 4, 20.
 Timaru, 45, 49.
 Timor, 55, 66, 67.
Tin, 13, 42, 65.
 Tjilatjap, 63.
Tobacco, 17, 23, 59.
 Tonga Islands, 52.
 Tongariro, m., 46.
 Toowoomba, 11, 23,
 24.
 Torrens, 1., 31.
 Torres St., 5, 20.
 Townsend, m., 7.
 Townsville, 4, 5, 11,
 20.
Trepang, 4, 5, 33, 66.
 Vegetable Creek, 18.
Vine, 11, 19, 23, 28, 33.
 Viti Levu, 53.
Volcanoes, 53, 56, 63.
 Wagga-Wagga, 9, 19.
 Waikato, r., 47.
 Wairarapa, 47.
 Waitemata, 45.
 Wakatipu, 1., 47.
 Wallace's Line, 55.
 Wallaroo, 12, 34.
 Wanganui, 49.
 Warrnambool, 25, 29.
 Wellington, m., 40.
 „ N.Z., 49, 51.
 Wentworth, 18.
 Westport, 45, 50.
Wheat, 11, 17, 23, 32, 49.
 Wilcannia, 18.
 Williamstown, 3.
 Wimmera, 28, 27.
Wool, 10, 23, 28, 49.
 Yarra, r., 3, 27.
 Yass, 19.
 Yilgarn, 12.
 York, 37.
 Zamboanga, 62.
 Zeehan, m., 42.

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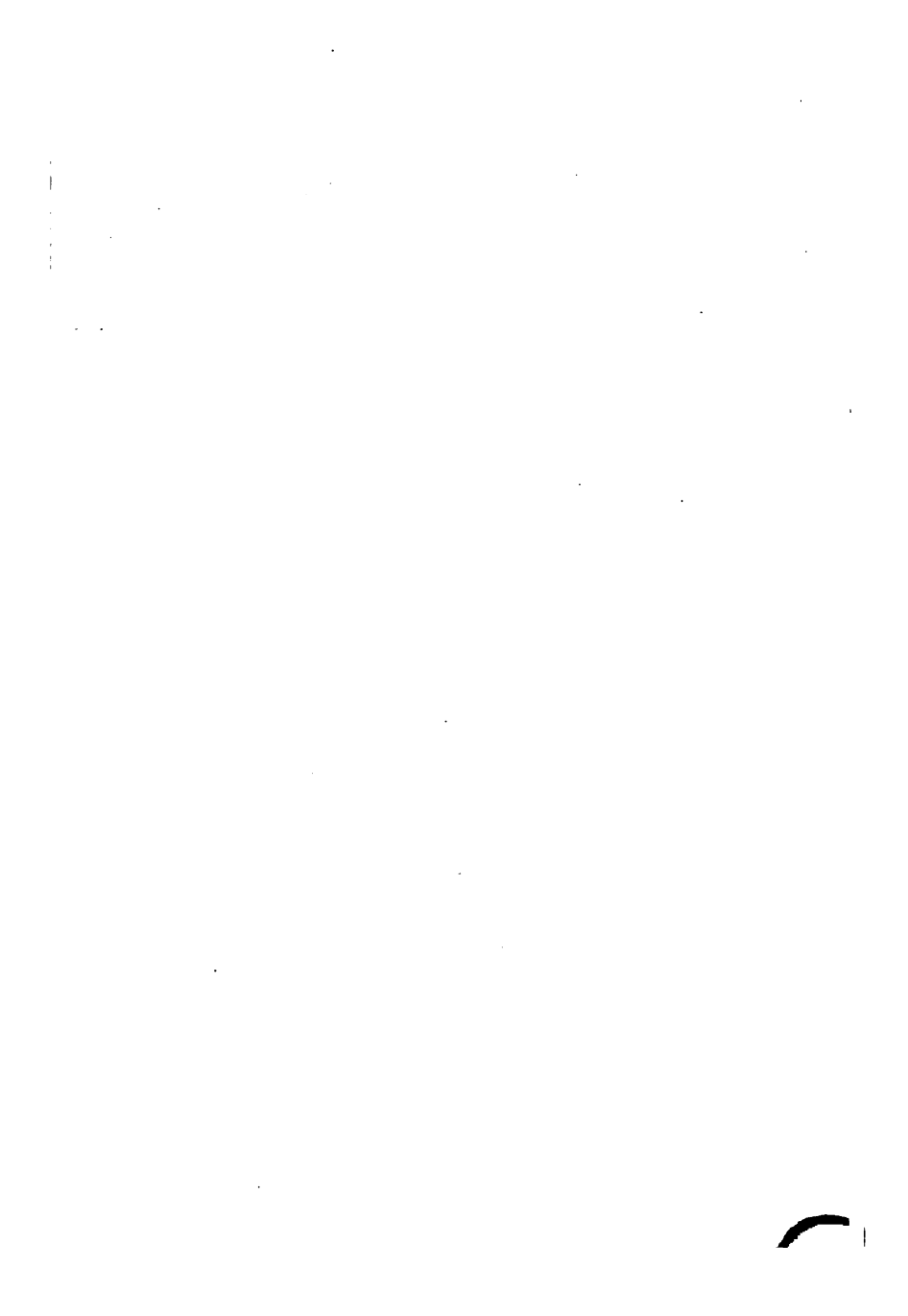
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